

Advant[®] OCS
with Master software

**MultiVendor Interface -
Allen-Bradley[®] DF1
with MVB and CI534V04
Advant[®] Controller 400 Series**

User's Guide

3BSE 013 712R0001



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Chapter 1 Introduction

1.1 Before You Begin

This manual describes asynchronous communication with the Allen-Bradley DF1 protocol in Advant Controller 400 Series (Advant Controller 410 and Advant Controller 450).

Allen-Bradley in Advant Controller 400 is called MVI - Allen-Bradley DF1 (MultiVendor Interface - Allen-Bradley). You can use it for communication with, for example, other manufacturers control systems (PLCs).

You can use MVI - Allen-Bradley in multidrop type connection, see [Figure 1-1](#). The Advant Controller 400 always act as a master station.

The transmission speed on asynchronous link is up to 19200 bits/s. Traffic on the MVI - Allen-Bradley link is controlled by the master node. RTUs connected via MVI - Allen-Bradley appear in the Advant OCS system as RTUs in a MasterNet local control network.

This manual tells you how to configure and use MVI - Allen-Bradley from the application programs, that is, the process data base and the PC programs, in the Advant Controller 400. It is intended primarily for Advant OCS application builders, though it is also useful to commissioning and service engineers. To use it, you must be familiar with application building in the Advant Controller 400.

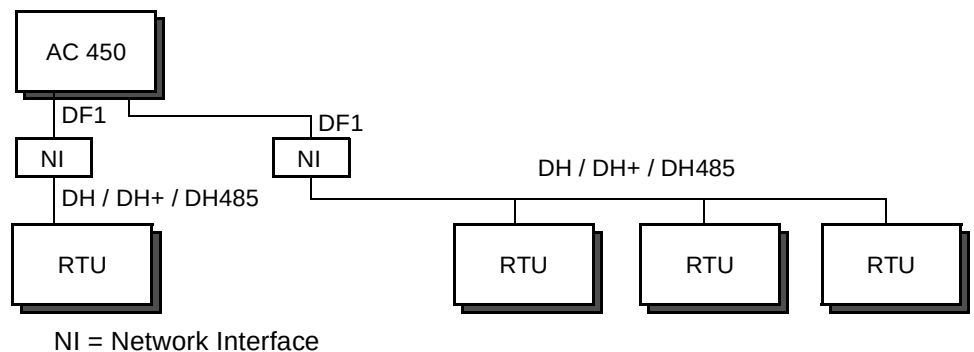


Figure 1-1. Example of a MVI - Allen-Bradley Configuration

1.2 Equipment Requirements

Basic equipment requirements for MVI - Allen-Bradley in the Advant Controller 400 are:

- Communication hardware in the Advant Controller 410
 - **CI534V04**
Communication submodule for connection of two MVI - Allen-Bradley links.

The communication submodule is connected to one of the four submodule positions on the main processor module PM150.

- Communication hardware in the Advant Controller 450
 - **CI534V04**
Communication submodule for connection of two MVI - Allen-Bradley links.
 - A free submodule position for the CI534V04 submodule on one of the following submodule carriers:
 - SC510**
Carrier without local processor.
(You can also use one submodule position for other functions, for example, MB 300.)
 - SC520**
Carrier with local processor for MB 300.
(You can also use one submodule position for other functions, for example, MB 300.)

Modems and Cables

The communication submodule CI534V04 is equipped with two independent, CCITT V.24 (RS-232-C), asynchronous communication ports. To connect the MVI - Allen-Bradley link, the following modems and cables are recommended:

- Westermo MD12¹
Full duplex modem for point-to-point communication up to 18 km.
- TC562
Full duplex modem for cable length up to 10 km. point -to-point up to 1 km at 19200bps. Power 24 V dc.
- TK577
TK577 is a 3 m cable with a DE9 socket for connection to one port on the front of the CI534V04 submodule and a DE25 PIN for connection to the modem.
- TK595
Cable assemblies DE9 socket DE9 PIN connection to the modem TC562.
- Bus cable with two twisted pairs, each pair individually shielded, minimum conductor area 0.22 mm². You can use the following cable or a similar cable:
 - Belden Type 9406
 - Kabelmetal Type DUE 4552
 - Alpha Type 6032
 - Norsk Kabel Type O6802
- Cable for connecting Modem and KE1785 (Allen-Bradley Network Interface) refer [Table 2-3](#) for wiring details.

Engineering Tools

To build the data base and the PC program in the Advant Controller 400, you need an engineering station.

1. Ordered from Westermo Teleindustri AB, Stora Sundby, Sweden

1.3 How to Use This Book

Figure 1-2 shows the basic structure of the Advant System’s documentation. Each document, describing either hardware or software, is built around this structure to make it easy for you to locate related information in any of the document.

This book is organized into chapters and sections as shown in Figure 1-2.

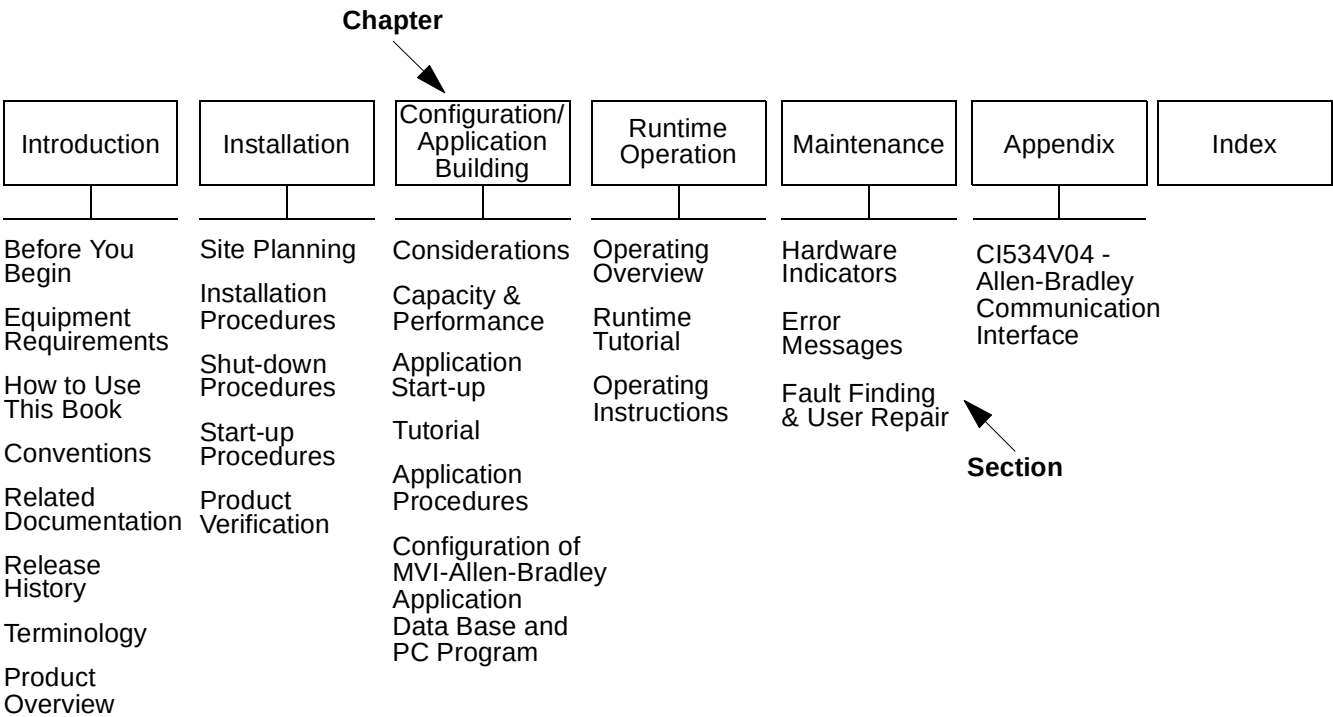


Figure 1-2. Organization of Manual

Introduction

This chapter describes MVI - Allen-Bradley functions in the Advant Controller 400, system layout, hardware requirements, related documents, release history, terminology and the manual’s organization.

Installation

Chapter 2, Installation, tells you how to set up the MVI - Allen-Bradley communication hardware in the Advant Controller 400. You will also find descriptions of the shutdown and start-up procedures and how to verify correct operation after you power up.

Configuration and Application Building

[Chapter 3, Configuration/Application Building](#) describes how to configure the process data base, define commands for data exchange, store data and build the PC program for flow control on the communication link. You will find capacity and performance figures for the communication and an example of an application program in this chapter. Configuration of MVICHAN data base element, MVINODE data base element and using MVI - Allen-Bradley in multidrop configuration are also described.

Runtime Operation

In [Chapter 4, Runtime Operation](#), you will find information on how to check the link status and how to activate the application for transmission of commands and data.

Maintenance

[Chapter 5, Maintenance](#) translates error messages from the MVI - Allen-Bradley CI534V04 submodule. This chapter also describes a fault-finding procedure.

1.4 Conventions

Following conventions are used in this manual:

- All inputs to data base elements which require you to enter a value are **boldfaced**.
- References to other documents are in *italic*.

1.5 Related Documentation

[Table 1-1](#) lists all documentation related to MultiVendor Interface - Allen-Bradley concerning further information about application building.

NOTE

The delivery binder includes a document, *Release Notes*, which comprise the latest product information not covered by the standard user documentation listed below. You may find, for example, additional, changes, limitations, alerts, etc.

Table 1-1. Related Documentation

Category	Title	Description
System Products	Advant Controller 410 User's Guide	This manual provides information about the Advant Controller 410 system, its capabilities and its limitations.
	Advant Controller 450 User's Guide	This manual provides information about the Advant Controller 450 system, its capabilities and its limitations.

Table 1-1. Related Documentation (Continued)

Category	Title	Description
Configuration / Application Building	AMPL Configuration Advant Controller 400 Series Reference Manual	Instructions for the configuration and application programming of Advant Controller 410/450 systems using Advant Station 100 Series ES. Commands for diskette handling are described in the User's Manual on the tool concerned.
	Data Base Elements Advant Controller 400 Series Reference Manual	Data for all data base elements in Advant Controller 410/450.
	PC Elements Advant Controller 400 Series Reference Manual	PC Elements Advant Controller 400 Series Reference Manual
	Source Code Handling User's Guide	This manual contains description of and instructions for source code handling of PC programs and data bases. It contains instructions for designing source code, editing, loading and dumping and correcting defective programs.
Options	MasterNet User's Guide	Manual describing how to configure, install and maintain MasterNet communication networks, Master Bus300, MasterBus 300E and GCOM.
Others	DF1 protocol and command set Reference Manual	This book of Allen-Bradley provides detailed information about the Allen-Bradley protocols.

1.6 Release History

Table 1-2 lists the development of MVI - Allen-Bradley DF1 with MVB and CI534V04 release history.

Table 1-2. Release History

Version	Description
1.0	Initial Release for Advant Controller 400 Series.

1.7 Terminology

A-B is an abbreviation for Allen-Bradley.

AC 400 is an abbreviation for Advant Controller 400 Series (Advant Controller 410 and Advant Controller 450).

Advant OCS is used for Advant Open Control System, with Master software, throughout this manual.

AMPL is an abbreviation for the ABB Master Programming Language. AMPL is a function-block language with graphic presentation which is especially oriented towards process control. The AMPL is used for configuration and application building in Advant Controllers.

Controller refers to Advant Controllers.

DAT is a concept in the data base that holds a data value (one Real (4 bytes), one Integer (2 or 4 bytes) or 32 Boolean values). The data values for MVB references are held by connected DAT elements.

NOTE

MVI - Allen-Bradley only supports DAT elements with 2 byte Integers or 32 Boolean values.

DB is an abbreviation for data base.

DF1 is the proprietary protocol of Allen-Bradley used for interface Allen-Bradley with external computer.

DH is an abbreviation for data highway network.

DH+ is an abbreviation for data highway plus network.

DH485 is an abbreviation for data highway 485 network.

ES is an abbreviation for Engineering station

MB 300/300E or MasterBus 300/300E is a high-speed bus used to interconnect Controllers, Operator Stations and Communication Stations in Advant OCS.

MVB (MultiVendor Interface Data Block) is the data base element defining the command used for control of RTUs and is also the data base element used for data transfer. It is used for transfer of block of data in an Advant OCS network.

MVI is an abbreviation for Advant OCS Multi Vendor Interface.

NI is an abbreviation for Network Interface.

PC program (Process Control program) is a program written in AMPL.

PLC is an abbreviation for Programmable Logic Controller (for example, SLC 504).

Poll messages (idle traffic) are cyclically sent from a MVI-Allen-Bradley node to the RTUs when nothing else is transferred on the MVI-Allen-Bradley link (cycle time can be configured).

The poll messages are necessary for supervision of the link status. The Allen-Bradley diagnostic status command is used as a poll message.

1.8 Product Overview

MVI - Allen-Bradley in the Advant Controller 400 provides communication capabilities to A-B Data Highway through RS232 Network Interface. NI converts DH/DH+/DH485 protocols to the DF1 protocol and vice versa, the DF1 protocol is used to communicate the RTU with CI534V04 submodule of AC400. Traffic on a MVI-Allen-Bradley link is controlled by a master node. Direct communication is possible only between the master and the RTUs.

MVI - Allen-Bradley in Advant Controller 400 consists of three parts:

- **PC program** (Process Control program), written in AMPL, is used to define and control the data flow on the link.
- Advant OCS process **data base** is used to configure the communication submodule, CI534V04, and to store the data.
- **CI534V04** communication submodule runs the MVI - Allen-Bradley DF1 protocol in the Advant Controller 400.

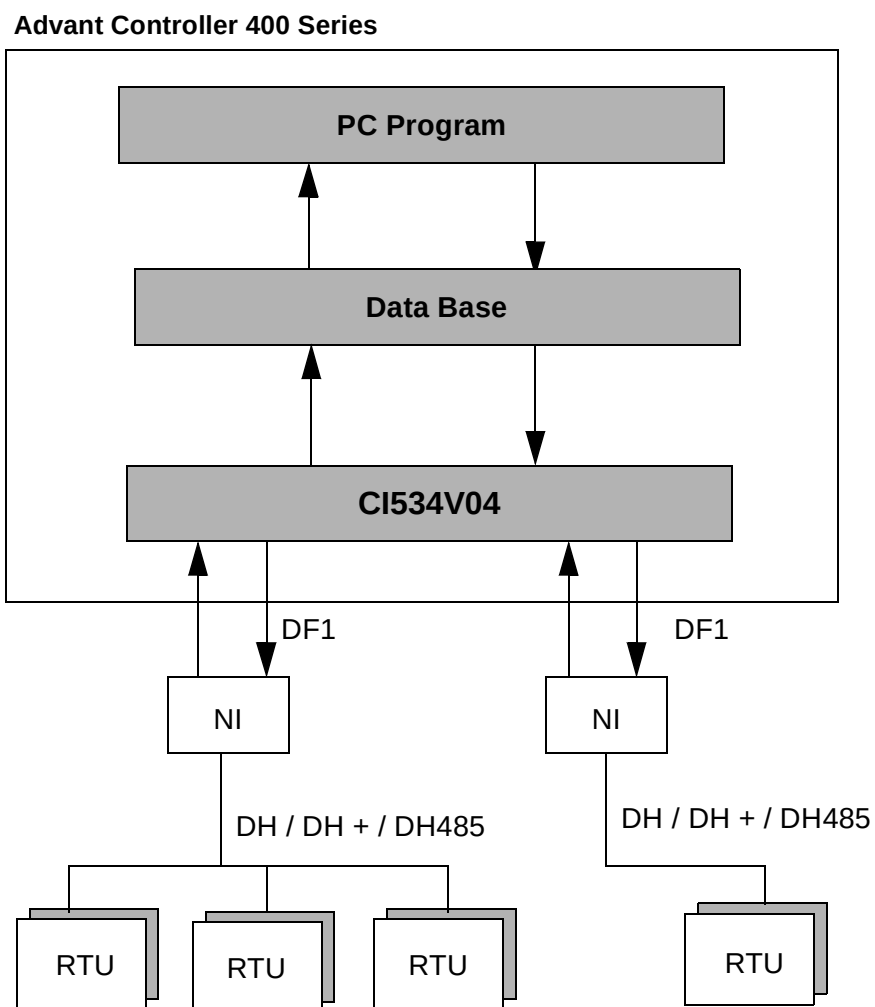


Figure 1-3. Overview of MVI - Allen-Bradley in Advant Controller 400

CI534V04 submodule is installed in the central subrack of the Advant Controller 400. The CI534V04 submodule is equipped with two independent, asynchronous communication ports for MVI - Allen-Bradley communication. You must configure the ports as master on the asynchronous link. The setup of each port is individually defined by a number of data base elements, see [Section 3.6, Configuration of MVI - Allen-Bradley Application Data Base and PC program](#).

Each port forms a local control network within the Advant OCS system with the network numbers 1 to 9. Since every RTU on the MVI - Allen-Bradley bus is part of an Advant OCS control network, each node (including the master node) must have a unique node number, 1 to 99, within the controller concerned.

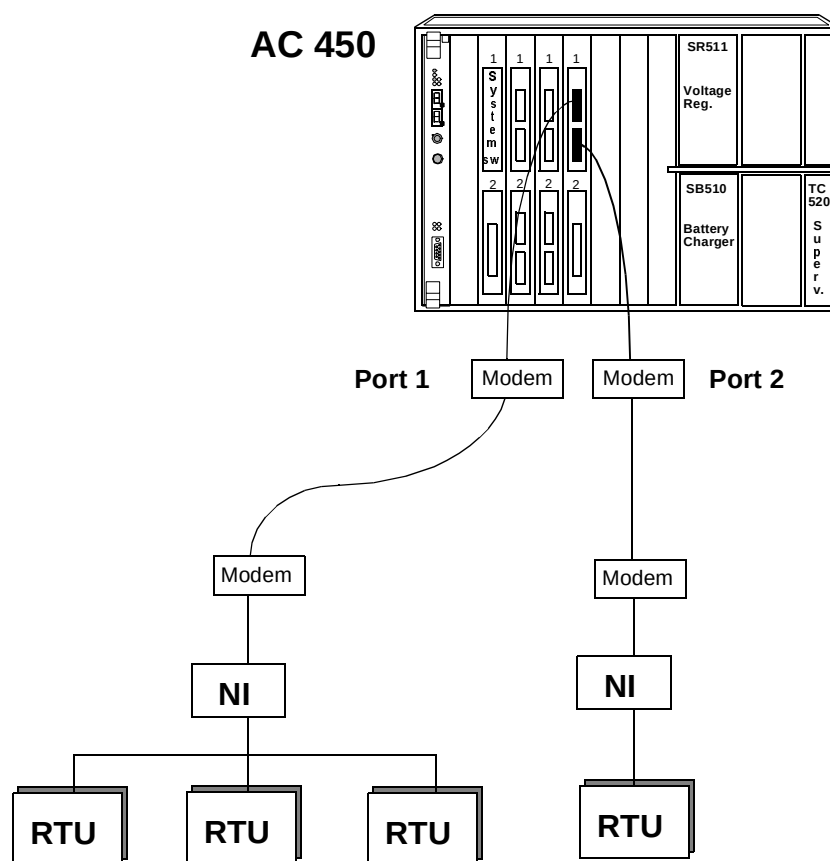


Figure 1-4. MVI - Allen-Bradley Configuration Example

1.8.1 Functionality

The following Allen-Bradley commands are implemented in the CI534V04 submodule:

- **PLC2 Unprotected Read**
Read Command used to read the integer values from the PLC2.
- **PLC2 Unprotected Write**
Write Command used to write the integer values to the PLC2.
- **PLC2 Protected Write**
Write Command used to write the integer values to the PLC2.
- **PLC2 Unprotected Bit Write**
To set/reset the 8 bit boolean values by using 8 bit set and 8 bit reset mask to the PLC2.

- **PLC2 Protected Bit Write**
To set/reset the 8 bit boolean values by using 8 bit set and 8 bit reset mask to the PLC2.
- **PLC5 Word Range Read**
Read Command used to read the integer values from the PLC5.
- **PLC5 Word Range Write**
Write Command used to write the integer values to the PLC5.
- **SLC503/504 Protected typed logical read with three address field**
Read Command used to read the integer values from SLC503/504.
- **SLC503/504 Protected typed logical write with three address field**
Write Command used to write the integer values to SLC503/504.

The functionality of the protocol is a **subset** of the Allen-Bradley command set.

For information about the configuration, refer to [Section 3.6.1, Data Base Elements for MVI - Allen-Bradley Configuration](#).

1.8.2 Functional Overview

The application building you will require in order to use MVI - Allen-Bradley consists of two main parts; the PC program and the data base (see [Figure 1-5](#)).

PC Program

Use the PC program to control the data flow and status of the RTU. All MVB data base element (see below) are activated from the PC program.

Data Base

The necessary data base input for the CI534V04 submodule is defined with configuration data base elements and data transfer data base elements.

The data base is divided into two parts: Configuration elements (MVIMOD, MVICHAN and MVINODE) and data transfer data base elements (MVB).

- **Configuration data base elements (MVIMOD, MVICHAN and MVINODE)**
MVIMOD data base element is used to set up the two ports on the CI534V04 submodule, see [Section 2.2, Installation Procedures](#)
MVICHAN (defines transmission speed, time-out times, etc.), **MVINODE** represents a node on the Allen-Bradley link (one element for each node), and holds the status information for the node.
- **Data transfer data base elements MVB**
Specifies commands and holds data.

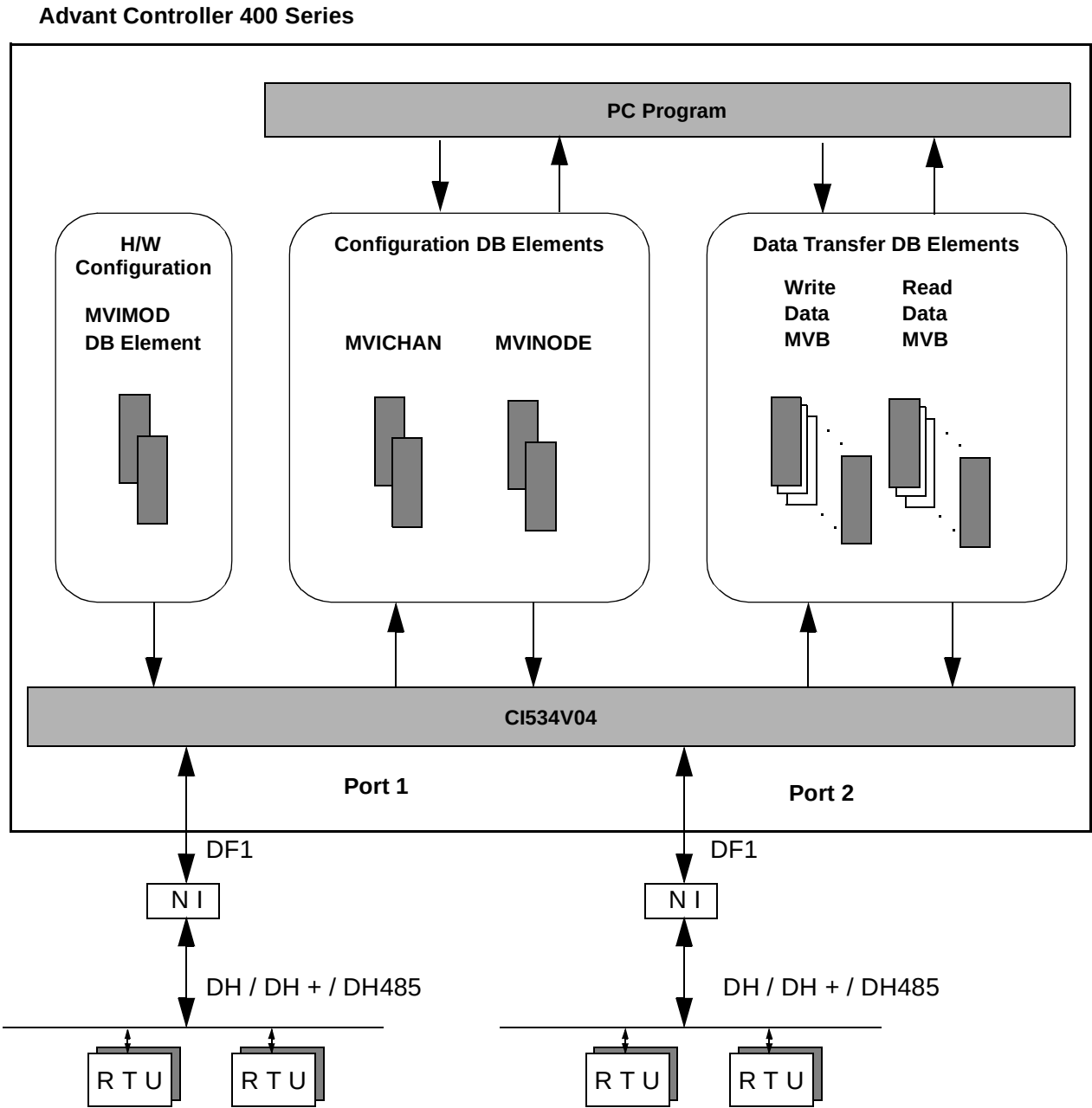


Figure 1-5. Functional Overview in the Advant Controller 400 for MVI - Allen-Bradley

1.8.3 Initiating a Connection

At start-up, all the configuration data base elements are automatically sent down to the CI534V04 submodule. The CI534V04 reports application errors if it does not receive all of the necessary configuration data base elements or if they contain illegal parameters.

The node is ready for initiation of the connection when the configuration data base elements are received, the data base element MVIMOD for the CI534V04 submodule is correctly set up and the correct modem signals are received from the modem. If full duplex mode is used, Data Set Ready (DSR), Data Carrier Detect (DCD) and Clear to Send (CTS) must be set. The current values of DSR, DCD and CTS are available in the MVICHAN data base element.

The CI534V04 submodule always restarts if the Advant Controller 400 is restarted.

1.8.3.1 Idle Poll

The CI534V04 submodule sends a message with Allen-Bradley diagnostic status command to the RTU (that is, a idle poll message). If a response is received from Allen-Bradley, a connection is established between the CI534V04 submodule and the responding RTU. In all other cases, there will be no initiation of the connection between CI534V04 and RTU.

The CI534V04 submodule cyclically sends idle poll messages when there is no pending command from CI534V04 to RTU. Idle Poll cycle time is specified in the MVICHAN data base element.

1.8.3.2 Network Interface Poll

The CI534V04 submodule starts to poll the Network Interface. When NI answers to a poll message, the communication has started.

The CI534V04 submodule cyclically sends NI poll messages when nothing else is transferred on the asynchronous link. The poll cycle time can be configured in the MVICHAN data base element PARAM4.

1.8.4 Data Transfer in CI534V04 Active Mode

All data transmission initiated by CI534V04 are handled by a number of MVB data base elements used to define the data to transmit or request. See [Section 1.8.4.1, Transmission of Data](#) and [Section 1.8.4.2, Request for Data](#) for an overview of these functions.

A maximum of 128 Integer registers (DAT(I), that is, 16 bit Integer) can be configured in the MVB, but the number of bytes to be actually transmitted on the link is depend on the type of RTU and MVB configuration.

1.8.4.1 Transmission of Data

The indications **(1)**, **(2)**, **(3)**, etc., in the text below refer to identical indications in [Figure 1-6](#).

For the transmission of data from Advant Controller 400 to a Allen-Bradley RTU, a number of MVB data base elements are used to command the CI534V04 submodule to handle the data transfer.

Each MVB data base element contains information on what data and how much to transfer. It also holds the actual data.

The PC program with the SENDREQ element activates (1) the sending of the MVB data base element, which holds the write command and data, from the Advant Controller 400 to the CI534V04 submodule. CI534V04 interprets the write command, converts the command and data (2) to Allen-Bradley format and transmits (3) to the Network Interface. The Network Interface forwards the command to DH/DH+/DH485. The RTU receives the message (4) and replies to the Network Interface which forwards to the CI534V04 submodule (5). The CI534V04 submodule (6) sends the reply message to the Advant Controller 400.

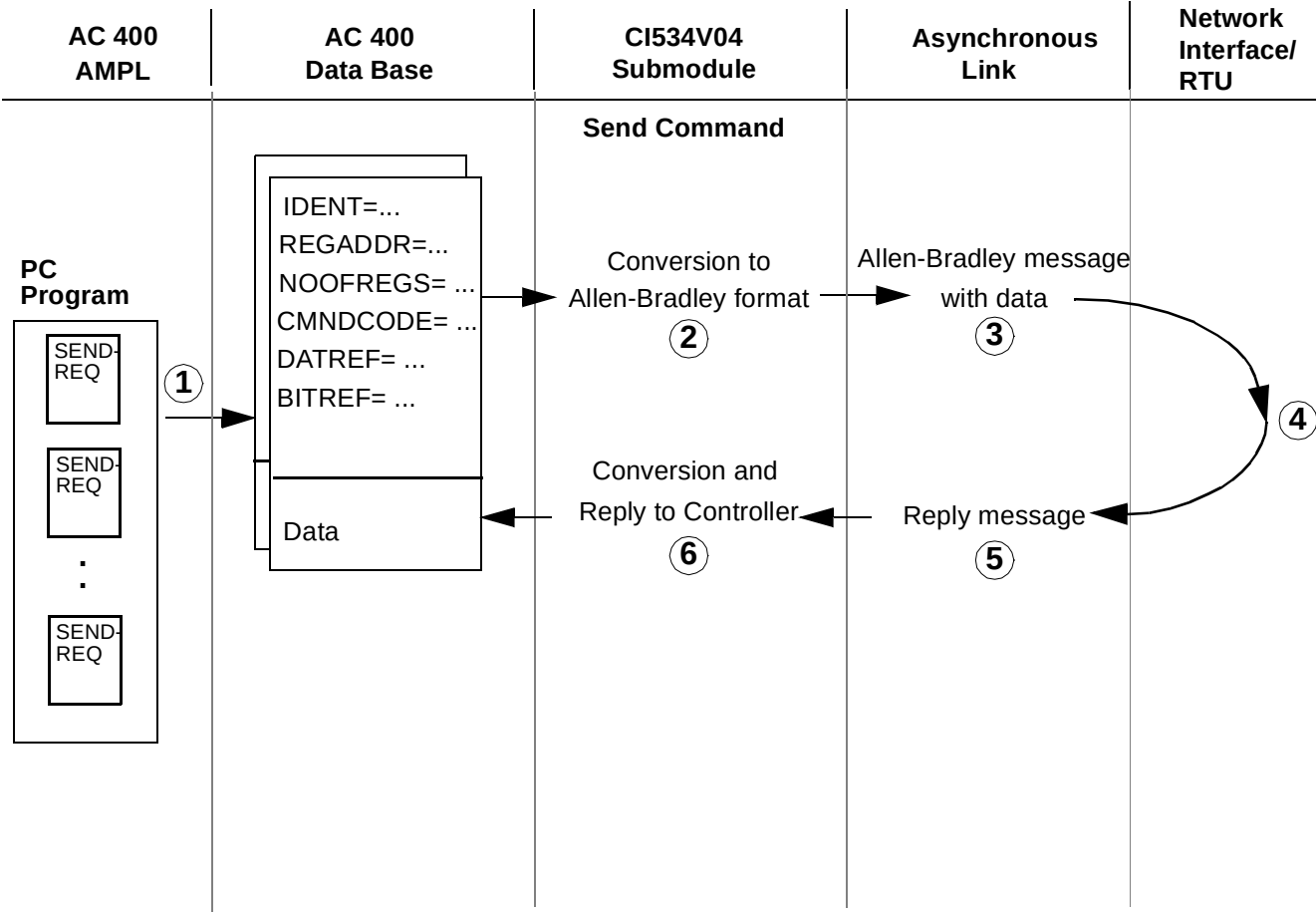


Figure 1-6. Data Transmission Block Diagram

1.8.4.2 Request for Data

The indications **(1)**, **(2)**, **(3)**, etc., in the text below refer to identical indications in [Figure 1-7](#). To request data from a Allen-Bradley RTU to Advant Controller 400, a number of MVB data base elements are used to command the CI534V04 submodule to handle the data request. Each MVB data base element contains information on what and how much data to receive. It also holds the received data.

The PC program with the SENDREQ element activates **(1)** the sending of the MVB data base element, which holds the read command and data, from the Advant Controller 400 to the CI534V04 submodule. The CI534V04 submodule interprets and converts the read command **(2)** to Allen-Bradley format and transmits **(3)** to the Network Interface. The Network Interface receives the message **(4)** and forward it to RTU through DH/DH+/DH485 network. RTU replies with data to NI which forward data to the CI534V04 submodule **(5)**. The CI534V04 submodule **(6)** sends the reply with data to the Advant Controller 400, which maps the data on the DAT reference of the MVB.

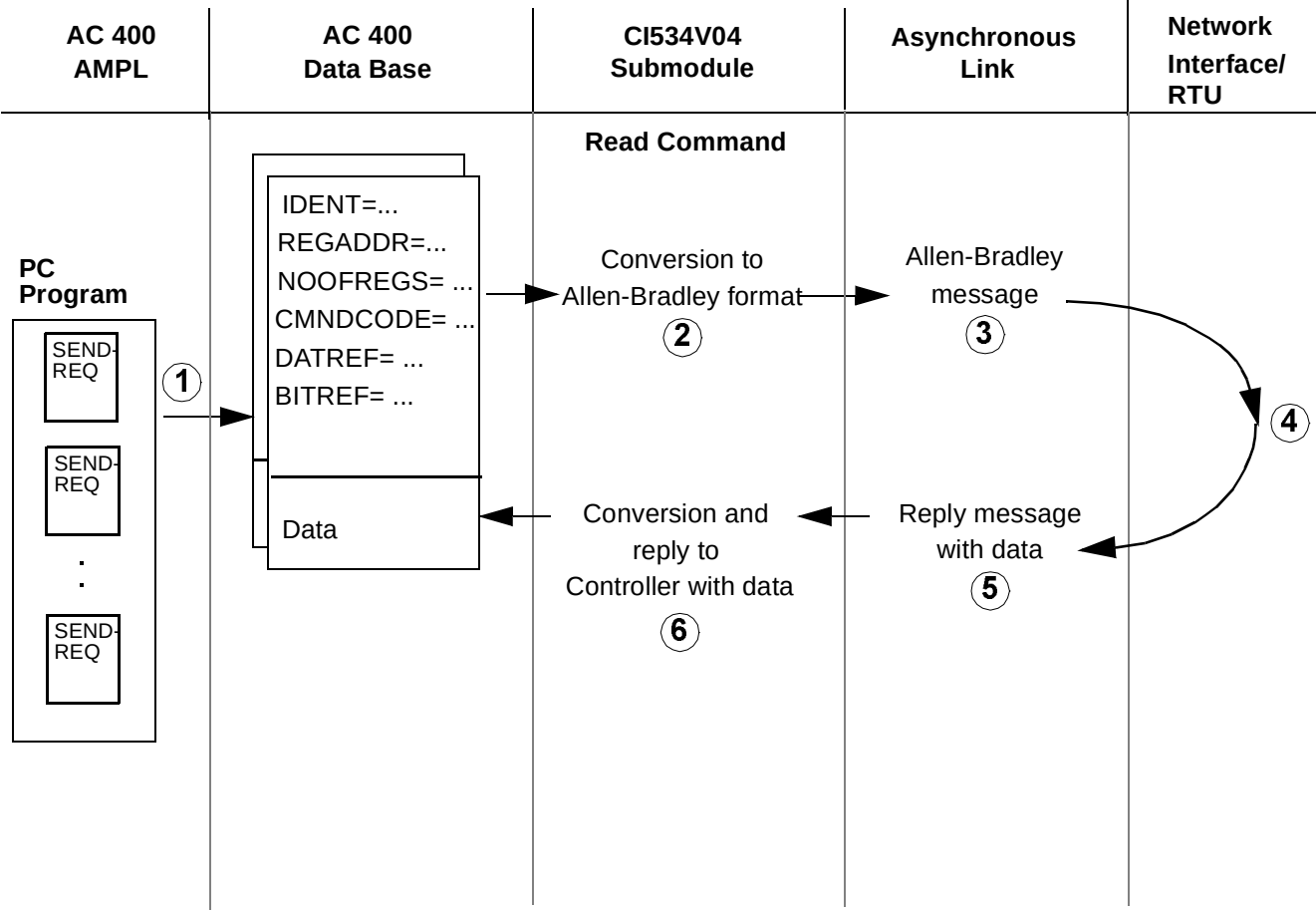


Figure 1-7. Data Reception Block Diagram

1.8.5 Message Flow on the Link

When no data is transferred on the asynchronous link, the CI534V04 continuously polls the Allen-Bradley Network Interface. Figure 1.8 shows the NI polling scheme.

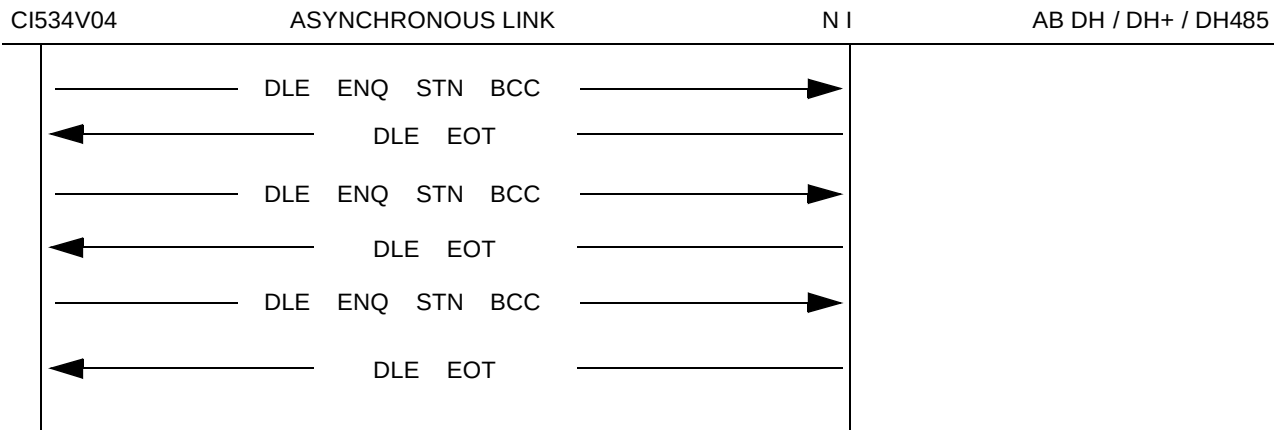


Figure 1-8. NI Polling Scheme

The CI534V04 submodule cyclically sends idle poll messages when nothing else is transferred on the link. Idle Poll cycle time is specified in the MVICHAN data base element.

If the Network Interface has something to send to the CI534V04, it sends the data when it's next polled by the CI534V04. When the CI534V04 has something to send to an RTU, it sends the data to the Network Interface instead of sending idle poll messages.

The figures below shows one simple case of data transfer between the CI534V04 and the RTU. Command message data bytes are represented by “cccc” and the corresponding reply message by “rrrr”..

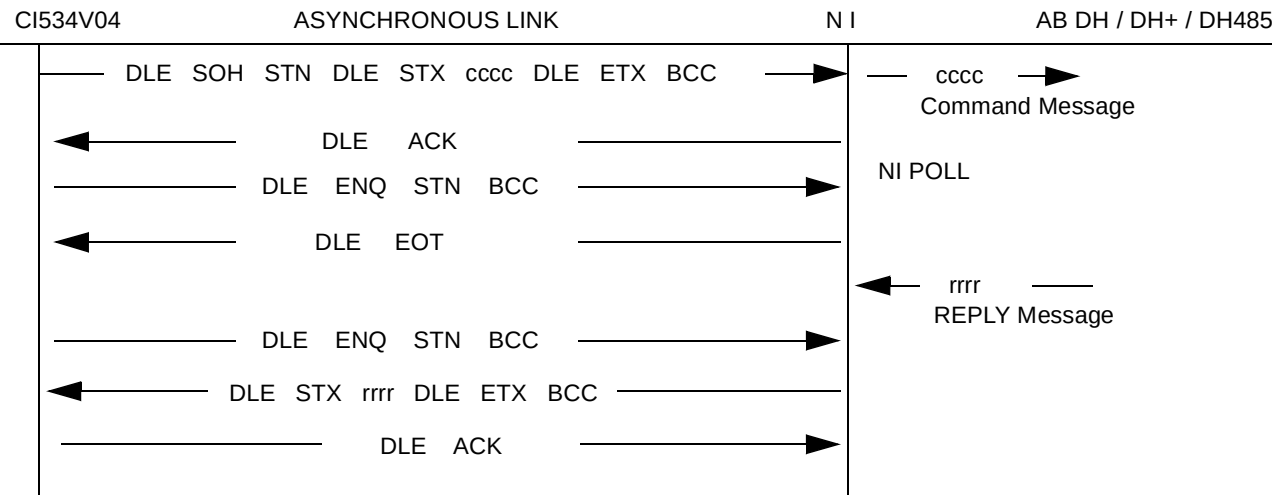


Figure 1-9. Data Transfer between CI534V04 and RT

1.8.5.1 Flow Control

A PC program controls the data flow on the two asynchronous ports by means of the PC element SENDREQ and status information received from the CI534V04 submodule.

You can block the SENDREQ PC elements through the status bits “Ready for Message” and “Link status” in the MVINODE data base element for the PLC concerned. The “Ready for Message” flag blocks the SENDREQ PC elements if data flow from the PC program exceeds the capacity of the link. This function automatically controls the flow.

Chapter 2 Installation

2.1 Site Planning

See the *Advant OCS Installation Rules* manual for guidelines on grounding, power supply, etc.

2.2 Installation Procedures

The MVI - Allen-Bradley submodule CI534V04 is equipped with two independent, CCITT V.24 (RS-232-C), asynchronous communication ports, see [Figure 2-1](#).

- In Advant Controller 410 the CI534V04 submodule is connected to one of the four submodule positions on the main processor module PM150, see [Figure 2-5](#).
- In Advant Controller 450 the CI534V04 submodule is connected to a free submodule position on one of the following submodule carriers; SC510 or SC520.

[Figure 2-1](#) shows two CI534V04 submodule connected to a SC510 carrier.

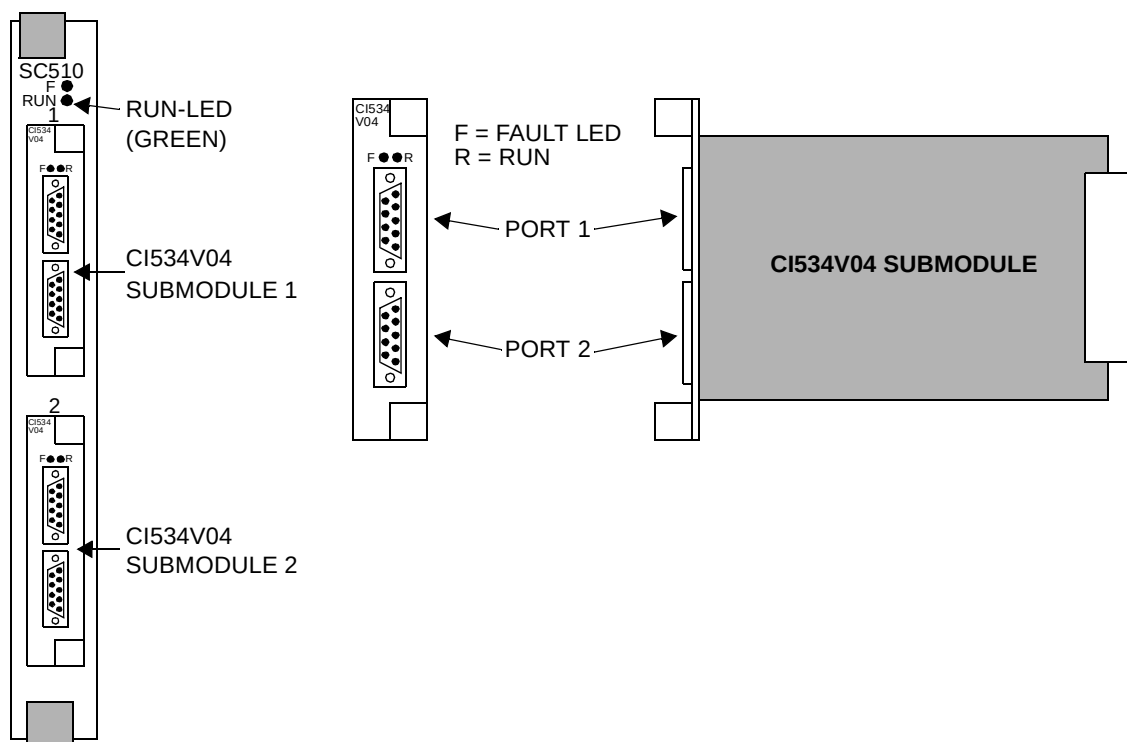


Figure 2-1. SC510 Carrier and CI534V04 Submodule

MVI - Allen-Bradley communicates with other units in a proprietary, local control network. Valid network numbers for a local control network are 1 to 9. The Advant Controller 400, and every RTU connected to MVI - Allen-Bradley, must have a node number, 1 to 99, which is unique within the controller. Modems and cables must be correctly installed. [Figure 2-8](#) shows an example of necessary modems and cables in a MVI - Allen-Bradley connection.

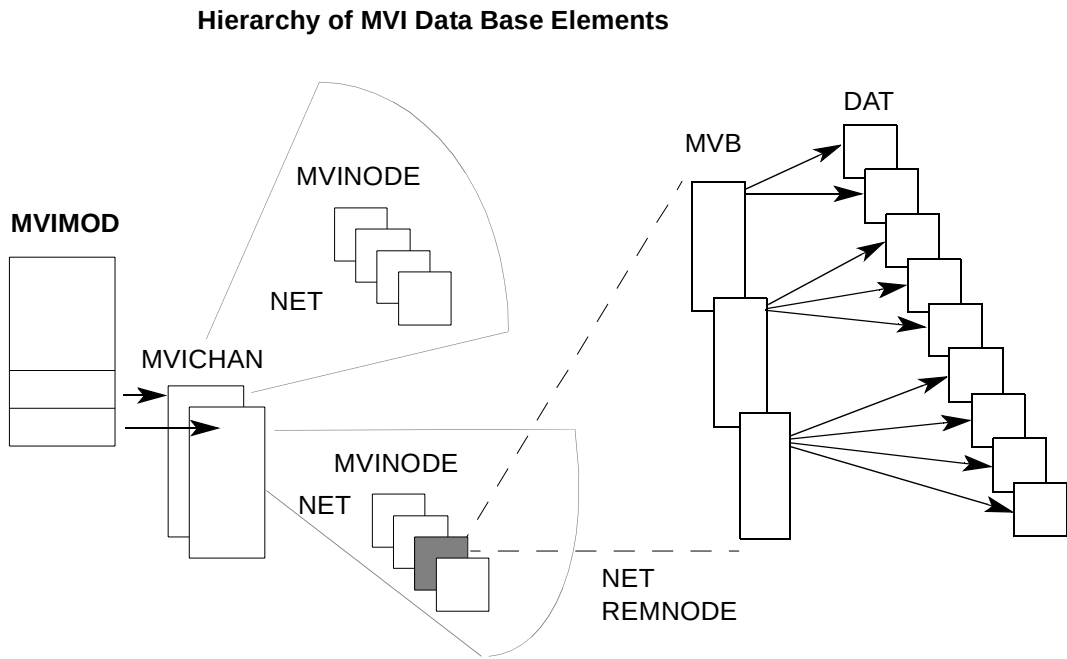


Figure 2-2. Hierarchy of MVI Data Base Elements

The setup for each port on the CI534V04 submodule is made with the data base element MVIMOD ¹⁾. There are no strappings on the CI534V04 submodule and no strappings on the carrier boards SC510 and SC520.

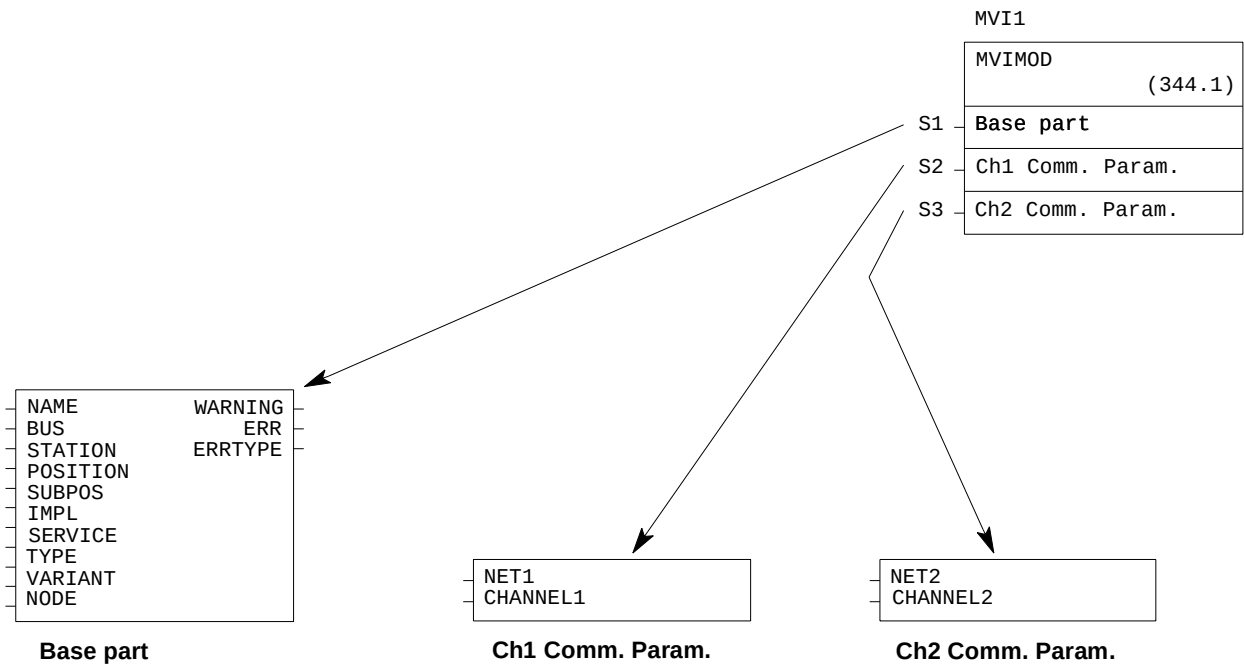


Figure 2-3. Overview of the MVIMOD Data Base Element

1. The call name for the data base element is MVIMOD and the element type is MVI.

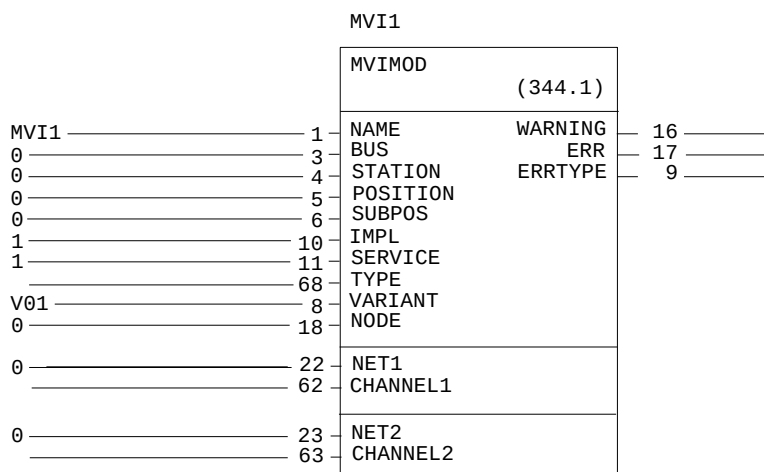


Figure 2-4. Data Base Element MVIMOD for Default Values

You must check or fill in correct values on the MVIMOD data base element (Element type is MVI and call name is MVIMOD). For further description, please refer to the *Data Base Elements Advant Controller 400 Series Reference Manual*.

Table 2-1. Properties for the Data Base Element MVIMOD

Terminal No.	Terminal	Value in AC450	Value in AC410	Description
-	MVIMOD Record number	1 - 5	1 - 2	CI534V04 submodule number. Record number for the MVIMOD data base element for the MVI-Allen-Bradley port defines the submodule number. Submodule numbers 1 - 5 are reserved to other modules than MVI. Record No 1 => submodule = 7 Record No 2 => submodule = 8 Record No 3 => submodule = 9 (only valid for AC450) Record No 4 => submodule = 10 (only valid for AC450) Record No 5 => submodule = 11 (only valid for AC450)
1	NAME			Unique NAME of the element.
3	BUS	0	0	Not used
4	STATION	0	0	Not used
5	POSITION	2 - 8	1	POSITION of the carrier board in the CPU rack, see Figure 2-5 and Figure 2-6 .
6	SUBPOS	1 - 2	1 - 4	SUBPOS ition on the carrier board, see figure below. To change the SUBPOS in operation mode, the IMPL must be set to 0. See Figure 2-6 .

Table 2-1. Properties for the Data Base Element MVIMOD (Continued)

Terminal No.	Terminal	Value in AC450	Value in AC410	Description
10	IMPL	1	1	IMPL emented = 1 to set CI534V04 submodule in normal operation 0 = the module is spare
11	SERVICE	1	1	To restart the communication module set the terminal SERVICE to 0 and back to 1.
68	TYPE	CI534	CI534	Always enter CI534 in upper case
8	VARIANT	V04	V04	V04 = MVI - Allen-Bradley
18	NODE	1 - 99	1 - 99	Set to AC 400's own node number. If node number of the AC 400 is already defined, NODE can only be set to that node number. In order to modify a node number >0, a COLD START of the AC 400 is necessary.
16	WARNING	0 - 1	0 - 1	WARNING flag indicating non-fatal errors. PC connection data type = B(r)
17	ERR	0 - 1	0 - 1	ERR or flag indication hardware or configuration error. PC connection data type = B(r).
9	ERRTYPE	0 - n	0 - n	ERR or TYPE . See Section 5.2, Error Messages for translation. PC connection data type I(r).
22 23	NET1 NET2	0 - 9	0 - 9	Local control NET work number for port 1 and 2 . In order to modify the already set network number, a COLD START of the AC 400 is necessary. All local control network numbers in the AC 400 must be unique. Use NET'n' = 0 if the port 'n' is not used.
62 63	CHANNEL1 CHANNEL2	- -	- -	Name of corresponding MVICHAN elements.

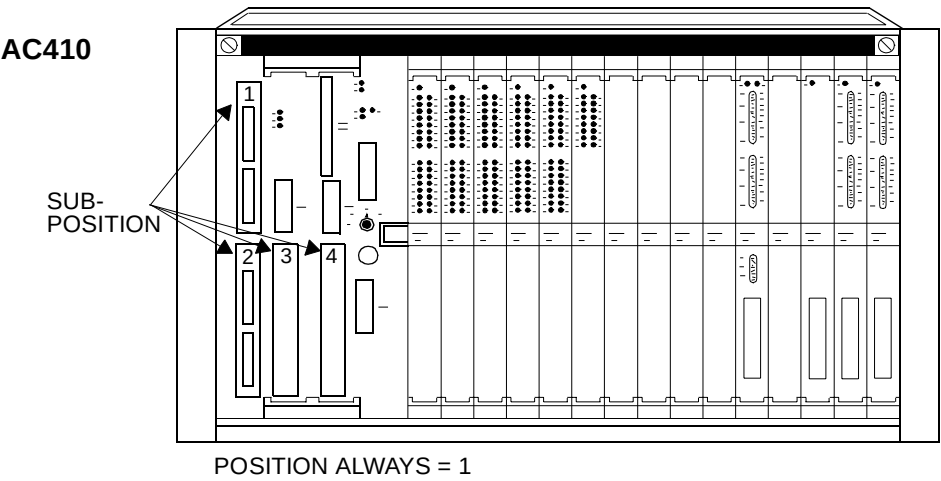


Figure 2-5. Position and Subposition for CI534V04 Submodule in Advant Controller 410

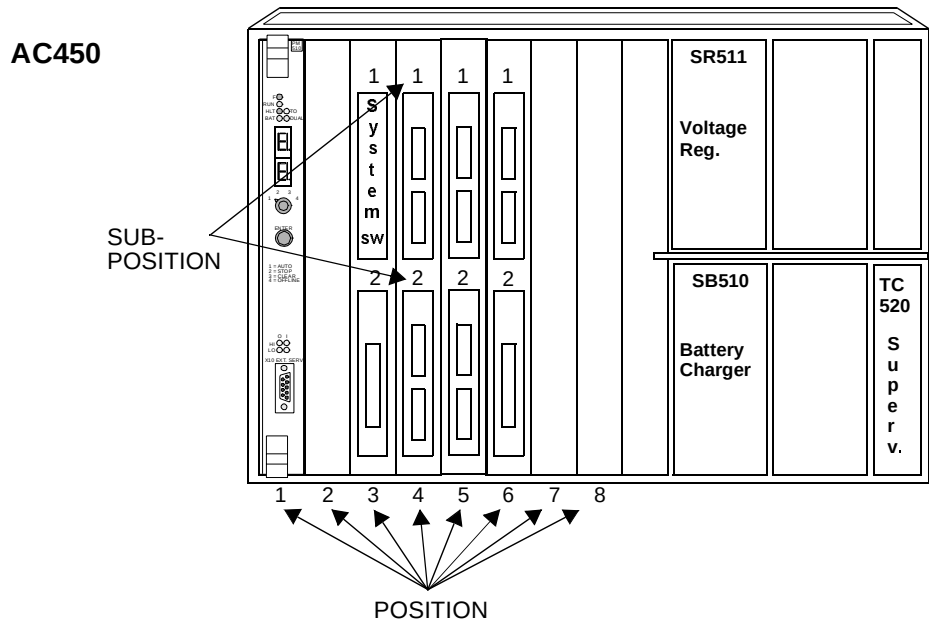


Figure 2-6. Position and Subposition for CI534V04 Submodule in Advant Controller 450

The cable TK577 has a DE9 socket for connection to one port on the front of the CI534V04 submodule and a DE25 PIN for connection to the modem. The connection between the 9- and the 25-pin connectors is shown in [Table 2-2](#). No wiring of the modem signals is made in the cable TK577. The cable TK595 has a DE9 socket for connection to one port of the CI534V04 submodule and a DE9 PIN for connection to the modem.

Table 2-2. Description of Connections According to CCITT V.24

Description	Signal	No. in 9- PIN Connector	No. in 25-PIN Connector	CCITT V.24	Direction
					IN ← — → OUT
Data Carrier Detect	DCD	1	8	109	← —
Receive Data	RD	2	3	104	← —
Transmit Data	TD	3	2	103	— →
Data Terminal Ready	DTR	4	20	108/2	— →
Signal Ground	SG	5	7	102	← →
Data Set Ready	DSR	6	6	107	← —
Request To Send	RTS	7	4	105	— →
Clear To Send	CTS	8	5	106	← —
Ring Indicator	RI	9	22	125	← —

The [Table 2-3](#) shows the wiring diagram of the cable for connecting NI (1785-KE A-B module) and modem. Table shows the connection details of connector at NI side (15-pin Male type connector) and connector at modem side (9-pin or 25-pin type connector) to be used. Also note that 15-pin connector side pin number 7 and pin number 13 is need to be shorted.

Table 2-3. Description of Connections for Cable used with Modem

Description	Signal	No. in 15- PIN Connector	No. in 9- PIN Connector	No. in 25- PIN Connector	CCITT V.24	Direction
						IN ← → OUT
Data Carrier Detect	DCD	8	1	8	109	←
Receive Data	RD	3	2	3	104	←
Transmit Data	TD	2	3	2	103	→
Data Terminal Ready	DTR	11	4	20	108/2	→
Signal Ground	SG	7	5	7	102	↔
Data Set Ready	DSR	6	6	6	107	←
Request To Send	RTS	4	7	4	105	→
Clear To Send	CTS	5	8	5	106	←
Shield	SHLD	1	-	-	-	←
Signal Ground	SG	13	5	7	102	↔

If the MVI - Allen-Bradley port is set up for full duplex handling of modem signals, and the modem does not support the signals mentioned in the [Figure 2-7](#), then cable TK577/TK595 need to be wired as shown in the [Figure 2-7](#).

Description	Signal	No. in 9-PIN Connector at MVI-side	CCITT V.24
Request To Send	RTS	7 —	105
Clear To Send	CTS	8 ←	106
Data Set Ready	DSR	6 ←	107
Data Carrier Detect	DCD	1 ←	109
Data Terminal Ready	DTR	4 —	108/2

Figure 2-7. Wiring for Full Duplex Handling of Modem Signals.

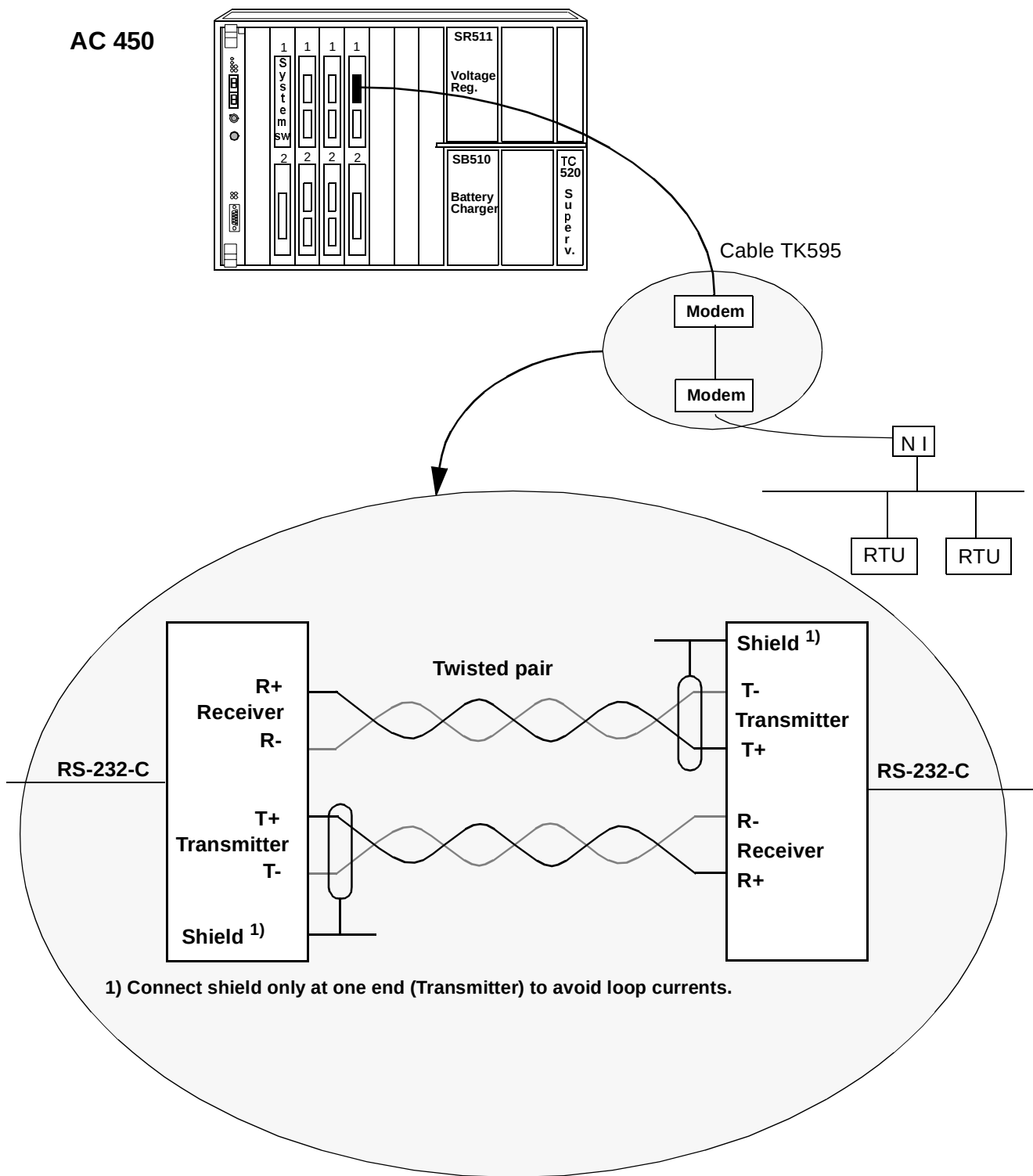


Figure 2-8. Cables and Modems in a MVI - Allen-Bradley Full Duplex Connection

2.3 Shut-down Procedures

The communication is stopped when the Advant Controller 400 is in configuration mode (mode P2, indicated on the front of the main processor module).

2.4 Start-up Procedures

The Advant Controller 400 must be in runtime mode (mode P1, indicated on the front of the main processor module) to communicate on the MVI - Allen-Bradley link. To start up the communication link, you must set up the hardware and the data base element MVIMOD, as described in [Section 2.2, Installation Procedures](#). If the parameter NET “n” for port “n” in the MVIMOD data base element ≠ 0, the CI534V04 submodule automatically receives all the configuration data base elements. See [Section 3.5, Application Procedures](#). The CI534V04 reports application errors if it does not receive all the required configuration data base elements.

The CI534V04 submodule always restarts if the Advant Controller 400 is restarted in any way. The CI534V04 also restarts when the terminal SERVICE on the MVIMOD element is changed from 0 to 1.

Check all the system messages when you restart the CI534V04 submodule. All configuration errors are reported at start-up. Error messages with task name MVIxxx and HLxxx are translated in [Section 5.2, Error Messages](#). Some errors are only reported once.

NOTE

If the network number or node number for any of the communication modules in the Advant Controller 400 is changed after the start-up of the node, the Advant Controller 400 must be COLD STARTED. (Connect an engineering station to the Advant Controller 400 and make a DUAP. Press ENTER on the main CPU with start-up switch in “CLEAR” position and make a LOAP.) See the manual *Source Code Handling User's Guide*.

2.5 Product Verification

When the CI534V04 submodule is correctly installed, the corresponding configuration data base elements are filled in and the controller is in operation mode, the following should be indicated:

- The green LED indicator on the front of the CI534V04 submodule must be lit.
- Data base element MVIMOD Terminals ERR and ERRTYPE = 0.

When the connection to a RTU is established, the following applies for the STATUS1 in the MVINODE data base element for the corresponding RTU:

- Link Status = 1 (MVNx:VALUE, where x is the record number).
- For more information regarding the RTU Status information, see [Table 3-7](#) and [Table 3-8](#).

The MVICHAN element must show the following when the link is connected:

- DSR = 1
- CTS = 1 (full duplex) or toggling between 1 and 0 (half duplex)
- DCD = 1 (full duplex) or toggling between 1 and 0 (half duplex).

NOTE

Displayed values from the MVICHAN element on the engineering station are not always synchronized to the actual value change of the modem signals; short pulses may not be displayed.

Chapter 3 Configuration/Application Building

3.1 Considerations

To set up the data base element to configure the MVI - Allen-Bradley, define the following:

- Network structure
 - Local control network number
 - Node numbers for all RTUs on the A-B Data Highway
 - Station Number for the RS232 Network Interface.
- Characteristics for the asynchronous Link
 - Transmission speed
 - Character length, number of stop bits, parity and duplex
 - Turnaround time in the RTU (response time for a message).
- RTU Register Addresses and A-B data files
 - Necessary RTU Register Addresses – and data files.

MVB data base elements and the PC program must be build for the control of the data flow on the asynchronous link. For building the MVB data base element and the PC program, consider the following:

- How are the data transferred between the nodes?
 - Which Command codes are to be used? See [Section 3.5.1, Allen-Bradley Commands](#) and [Section 3.6.2, MVI Data Block \(MVB\)](#).
- To select the cycle time for the PC program, you must know how fast data is to be transferred.

3.2 Capacity and Performance

The maximum number of communication ports and data base elements are:

- Advant Controller 410 can have a maximum of two CI534V04 Submodule with totally maximum four MVI - Allen-Bradley communication ports.
- Advant Controller 450 can have a maximum of five CI534V04 Submodule with totally maximum nine MVI - Allen-Bradley communication ports.
- Advant Controller 410 and 450 can each have a maximum of 99 MVINODE data base elements.¹
- The number of MVBs in an Advant Controller 410 or 450 is limited only by the amount of memory that can be set aside for the data base.
- Each MVB data base element can contain up to 128 DAT elements (110 DAT(B) elements). Each DAT(I) element in turn contain one Integer (2 bytes) and each DAT(B) element contains 32 Boolean.

1. MasterNet can handle up to 99 nodes.

For reasons related to performance and capacity, data that can change simultaneously should be collected into the same MVB data base element.

The table below describe the maximal number of Bytes that can be associated to one MVI A-B Command.

Table 3-1. Maximal Number of Bytes

Command Code	Max No. of Bytes
PLC2 Unprotected Read	244
PLC2 Protected Write	242
PLC2 Unprotected Write	242
PLC2 Protected Bit Write	2
PLC2 Unprotected Bit Write	2
PLC5 Word Range Read	244
PLC5 Word Range Write	232 ⁽¹⁾
SLC503/504 Protected Typed Logical Read	236
SLC503/504 Protected Typed Logical Write	234

(1) Depending upon the addressing used, also refer the DF1 protocol and command set reference manual.

To calculate the load of main CPU in AC400, you must consider the following to configure CI534V04:

- Load from PC program for flow control to the MVI-Allen-Bradley link
- Load from the MVB data base element communication.

Calculation of load from PC program and data base element communication is described in the *Advant Controller 400 Series User's Guide*.

The CI534V04 submodule can handle a total of 50 RTU nodes, divided on two ports. One single port can handle up to 31 RTU nodes.

Table 3-2 shows the maximum capacity for each port on the CI534V04. The capacity is valid for transfer of the commands with a cycle time on the PC program of 11 ms for the data flow control, see [Section 3.6.5, PC Program Layout](#). This gives maximum performance for the link. The system load must be carefully considered in every single case. The performance measurement is made with one port, that is, the AC400 communicates with one node. The test configuration used for this test is done by using simulation software to avoid the network delay, and also tested with 11ms, 110ms with baud rate 9600 and 19200 alternatively.

Table 3-2. Maximum Number of Read or Write Commands

Command	Number of Bytes	Transmission Speed (bits/s)	Average No. of Commands / Sec. (cycle time 11 ms)	Average No. of Commands / Sec. (cycle time 110 ms)
Unprotected Read (PLC2)	2	9 600	10	9
Unprotected Read (PLC2)	70	9 600	7	4
Unprotected Read (PLC2)	128	9 600	6	4
Unprotected Read (PLC2)	190	9 600	5	4
Unprotected Read (PLC2)	244	9 600	4	4
Unprotected Read (PLC2)	2	19 200	10	9
Unprotected Read (PLC2)	70	19 200	8	4
Unprotected Read (PLC2)	128	19 200	6	4
Unprotected Read (PLC2)	190	19 200	5	4
Unprotected Read (PLC2)	244	19 200	4	4
Unprotected Write (PLC2)	2	9 600	10	9
Unprotected Write (PLC2)	70	9 600	8	4
Unprotected Write (PLC2)	128	9 600	6	4
Unprotected Write (PLC2)	190	9 600	5	4
Unprotected Write (PLC2)	242	9 600	4	4
Unprotected Write (PLC2)	2	19 200	10	9
Unprotected Write (PLC2)	70	19 200	8	4
Unprotected Write (PLC2)	128	19 200	6	4
Unprotected Write (PLC2)	190	19 200	5	4
Unprotected Write (PLC2)	242	19 200	4	4

NOTE

The capacity depends on the load in the Advant Controller 400, the size of the data base in the Advant Controller 400, the response time in the RTU, the length of the messages and the transmission speed.

3.3 Application Start-up

To build the application data base and PC program in the Advant Controller 400, you need an engineering station. Before you can start up the communication with RTUs the following is needed:

- Dimension the data base in the Advant Controller 400 (with the command *DIMDB* from the engineering station). The data base must be dimensioned for the MVIMOD, MVICHAN, MVINODE, MVB and DAT data base element.

For each CI534V04 submodule you need:

- One MVIMOD data base element

For each port you need:

- One MVICHAN data base element.
- One MVINODE data base element for each RTU connected.
- MVB data base elements to define commands and to hold data.
- Up to 128 DAT elements for each MVB data base element.
- The Advant Controller 400 must be dimensioned for PC programs (with the command *DIMPC* from the ES).
- Create the data base elements with the command *CRDB MVIMOD*, *CRDB MVICHAN*, *CRDB MVINODE* and *CRDB MVB*. Configure the data base element according to the description in [Section 3.5, Application Procedures](#), [Section 3.6.1, Data Base Elements for MVI - Allen-Bradley Configuration](#) and [Section 3.6.2, MVI Data Block \(MVB\)](#). The DAT elements are created automatically when the MVB data base element is created.
- Build a PC program as described in [Section 3.6.5, PC Program Layout](#).
- When the application data base and PC program are created properly, you can start up the communication as described in [Section 2.2, Installation Procedures](#).

3.4 Tutorial

The indications **(A)**, **(B)**, **(C)**, etc., in the text below refer to identical indications in the figures describing the data base and PC program in this example.

This example describes the necessary application programming and data base in the Advant Controller 450 for writing 24 DAT(I) from the AC400 to a RTU node and reading 24 DAT(I) from the same RTU. The register address 0 **(A)** is used for the PLC2 Protected Write command **(B)** and also register address 0 **(C)** is used for the PLC2 Unprotected Read command **(D)**.

Data related to the CI534V04:

- CI534V04 submodule number = 7 (MVIMOD Record number = 1) **(H)**
- Reference (Name of) to the MVICHAN data base element corresponding to the 1st channel **(I)**
- Node number = 10 **(J)**
- Network number = 4 **(K)** MVIMOD in POSITION = 4 and SUBPOSITION = 2 **(L)**
- Only port 1 used.

Data related to the RTU:

- Node number = 16 **(S)**

Data related to the Modem: (U)

- DUPLEX = FULL, SPEED = 9600 bits/s, CHLEN = 8, STOPBITS = 1, PARITY = NONE, LINESTAB = 0 and CARRDEL = 0.

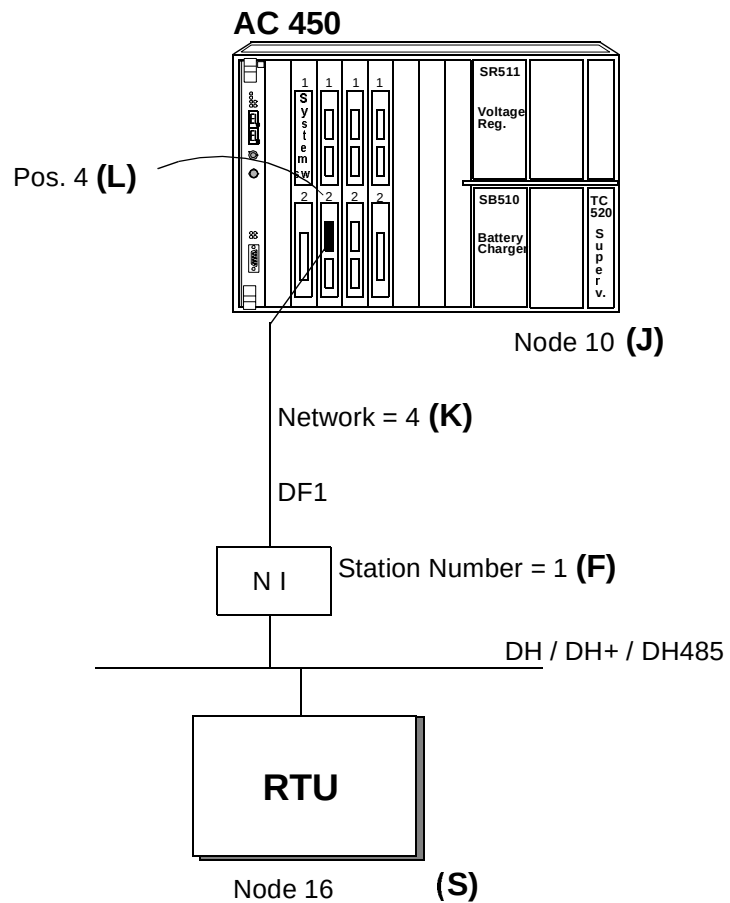


Figure 3-1. Configuration for the Example

3.4.1 Application in Advant Controller 400

3.4.1.1 Data Base in Advant Controller 400

- Three **Configuration data base elements** must be built in the application data base:
 - MVIMOD data base element
 - MVICHAN data base element
 - MVINODE data base element
- One **MVB data base element** is used to **write data** to the RTU.
- One **MVB data base element** is used to **read data** from the RTU.

Definition for the CI534V04 Submodule

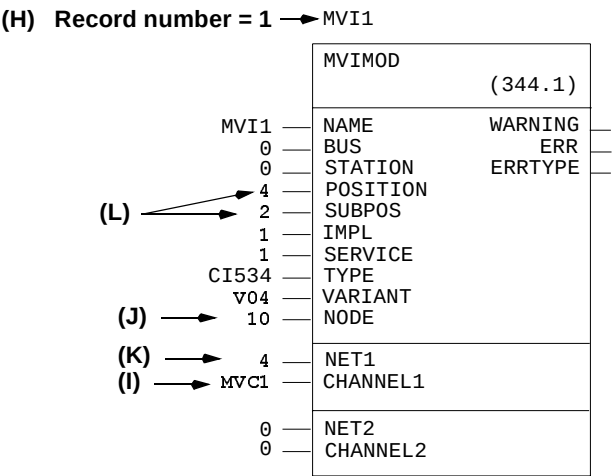


Figure 3-2. MVIMOD Data Base Element in Advant Controller 400

Configuration of the Communication Line

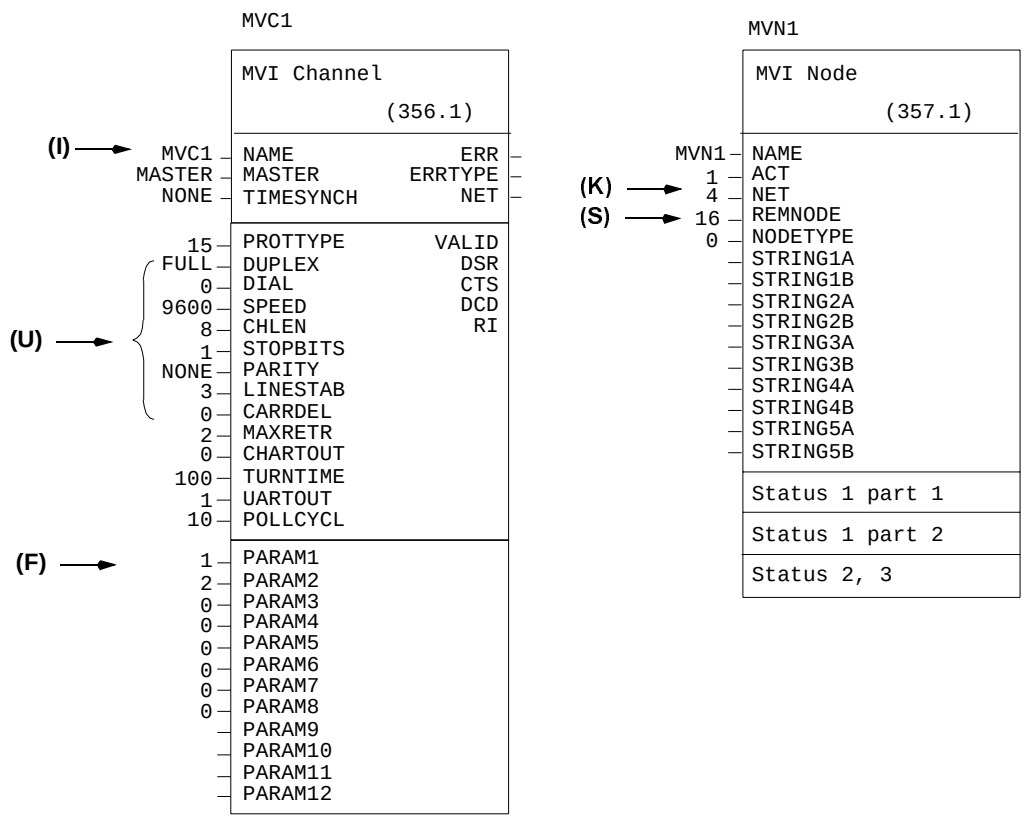


Figure 3-3. Line Characteristics, Network Configuration

Configuration of MVB

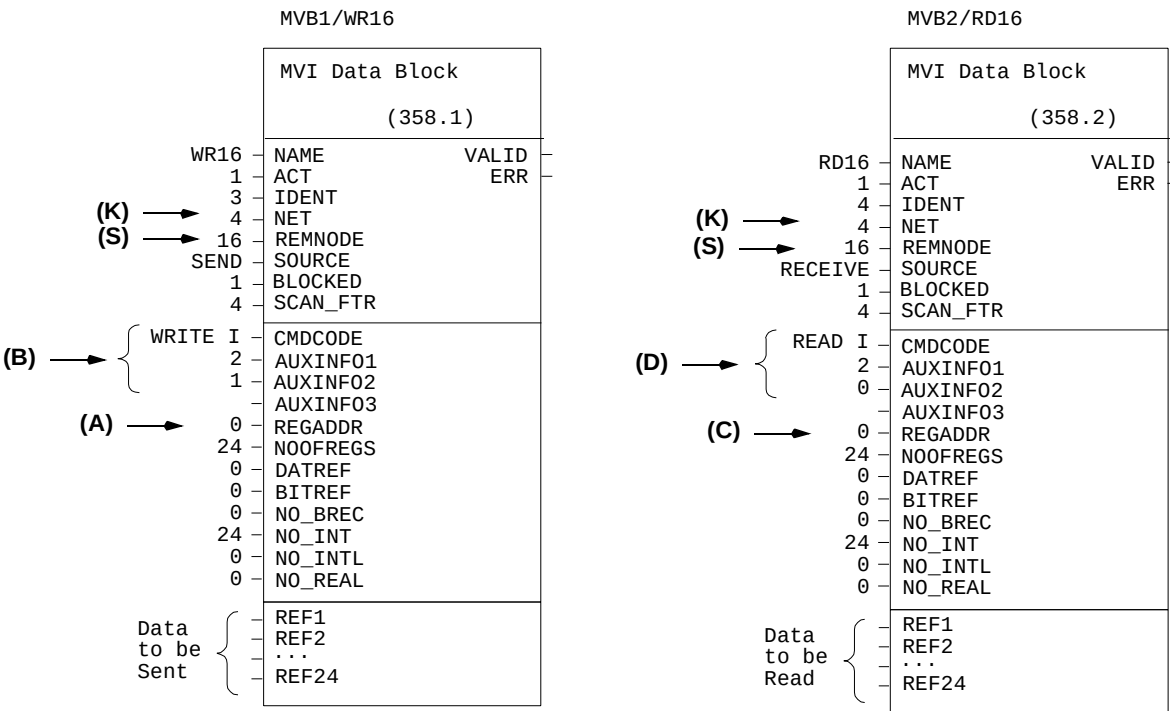


Figure 3-4. MVBs in Advant Controller 400

One sending MVB data base element is used for the Write Command and one receiving MVB data base element is used for the Read Command. Refer [Figure 3-4](#), the sending MVB data base element contains the data corresponding to Allen-Bradley RTU register address 0 (start address 0 is connected to REF1 of the MVB data base element) and the receiving MVB data base element (for the Read Command) contains the data corresponding to Allen-Bradley RTU register address 0 (start address 0 is connected to REF1 of the data base element). The send and receive MVB data base elements have NET and NODE defined as the network and node number to the RTU.

3.4.1.2 PC Program in Advant Controller 400

The PC program is designed to send one Write Command and one Read Command each 200 msec. The Link status (MVN1:VALUE) and Ready for Message (MVN1:VALUE6) are fetched from the MVINODE data base element for the RTU in question.

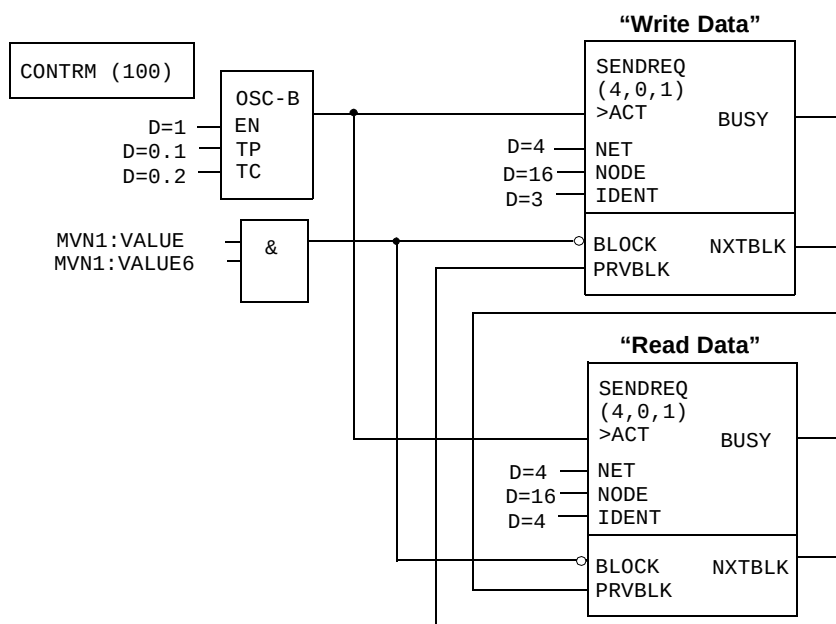


Figure 3-5. PC Program for sending Command to RTU Node 16

3.5 Application Procedures

This is a summary of the steps needed to build the application data base and PC program for the MVI - Allen-Bradley communication in the Advant Controller 400. See [Section 3.6, Configuration of MVI - Allen-Bradley Application Data Base and PC Program](#) for a detailed description of the MVI-Allen-Bradley application.

1. Answer the questions described in [Section 3.1, Considerations:](#)
 - Network structure
 - Line Characteristics
 - Command codes to be used for the data transfer
 - Register Addresses and / or A-B Data files to be used
 - Cycle time for PC program.

2. Build the Configuration data base elements:
 - MVIMOD data base element (always necessary)
 - MVICHAN data base element (always necessary)
 - MVINODE data base elements (always necessary).
3. Build MVB data base elements for command and data transfer:
 - Read Command data base element
 - Write Command data base element.
4. Build PC program for flow control:
 - The PC program (always necessary).

PC Program

Use the PC program to control the MVB data base element. The PC program controls the data flow through the asynchronous port by means of the PC element SENDREQ and status information received from the CI534V04 submodule. The SENDREQ element activates the MVB data base element. All SENDREQ PC elements used for MVB data base elements to the same RTU must be included in the same control module (CONTRM). The PC program is described in [Section 3.6.5, PC Program Layout](#).

Data Base

The necessary data base input for the CI534V04 submodule is defined with configuration data base elements and data transfer data base elements.

The data base is divided into two parts: Configuration elements (MVIMOD, MVICHAN and MVINODE) and data transfer data base elements (MVB).

- **Configuration data base elements (MVIMOD, MVICHAN and MVINODE)**

MVIMOD data base element is used to set up the two ports on the CI534V04 submodule, see [Section 2.2, Installation Procedures](#)

MVICHAN (defines transmission speed, time-out times, etc.), **MVINODE** represents a node on the A-B DH/DH+/DH485 link (one element for each RTU), and holds the status information for the RTU.
- **Data transfer data base elements MVB**

Specifies commands and holds data.

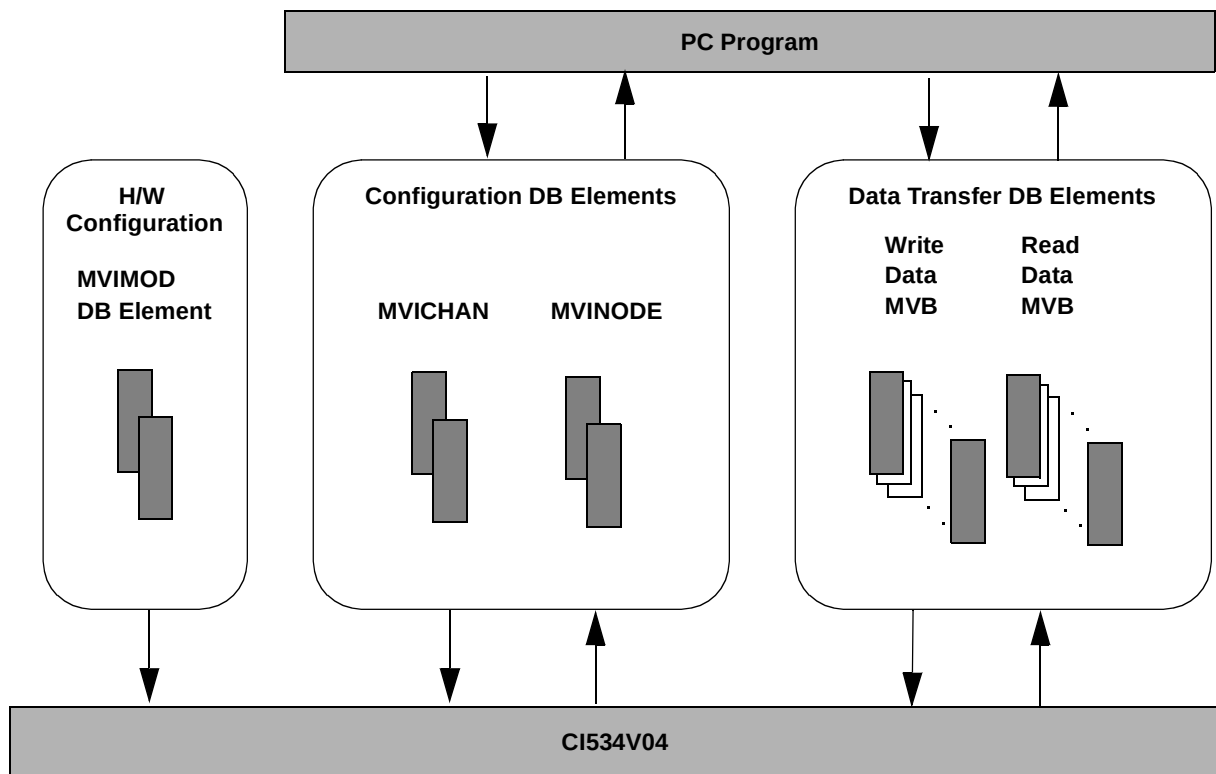


Figure 3-6. Overview of the Application for MVI - Allen-Bradley

3.5.1 Allen-Bradley Commands

The Allen-Bradley Commands supported by CI534V04 is mentioned in [Section 1.8.1, Functionality](#).

See [Section 3.6.3.1, Read Command](#) for a description of the Read MVB data base element and [Section 3.6.3.2, Write Command](#) for a description of the Write MVB data base element.

3.6 Configuration of MVI - Allen-Bradley Application Data Base and PC Program

3.6.1 Data Base Elements for MVI - Allen-Bradley Configuration

This section describes the configuration data base elements used to configure the CI534V04 submodule. These data base elements contain setup information for the hardware and software of the CI534V04 submodule. MVINODE DB element also receives the Status information from CI534V04. The status information can be used by the application program.

Minimum configuration of data base elements to start the communication with RTU is:

- One MVIMOD data base element
- One MVICHAN data base element
- One MVINODE data base element
- One MVI data block (MVB).

3.6.1.1 MVICHAN Data Base Elements

The line characteristics of CI534V04 are specified in one MVICHAN data base element for each communication channel. This means that one CI534V04 is fully configured by one MVIMOD data base element and two MVICHAN data base elements.

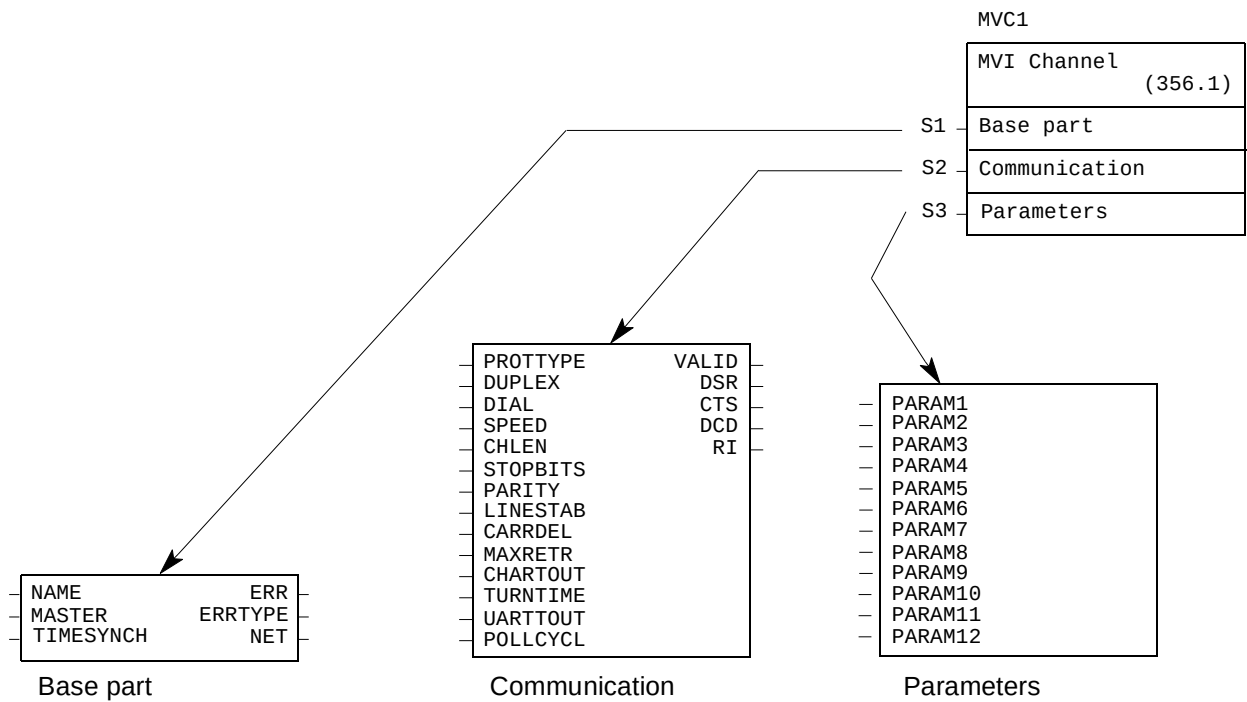


Figure 3-7. Overview of MVICHAN Data Base Element

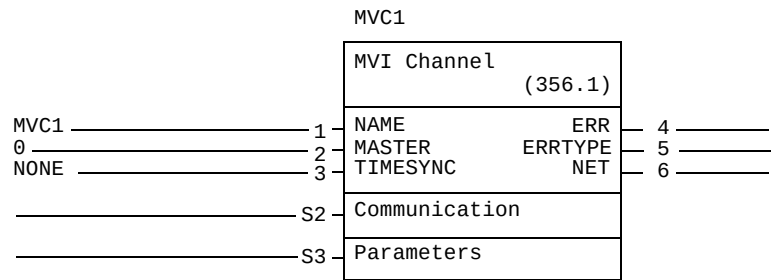


Figure 3-8. Data Base Element MVICHAN Base Part for MVI - Allen-Bradley

Table 3-3. Terminal Description for MVICHAN Base Part

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
1	NAME	User	MVCx	-	Unique element NAME .	Maximum 20 characters
2	MASTER	User	1	B(r/w)	MVI channel in: 1 for Master Mode	Only Master mode on asynchronous link
3	TIMESYNC	User	NONE	-	Not used in Allen-Bradley.	-
4	ERR	System	0	B(r)	ERR or.	-
5	ERRTYPE	System	0	IL(r)	ERR or TYPE .	-
6	NET	System	0	l(r)	NET work number of MVI channel.	-

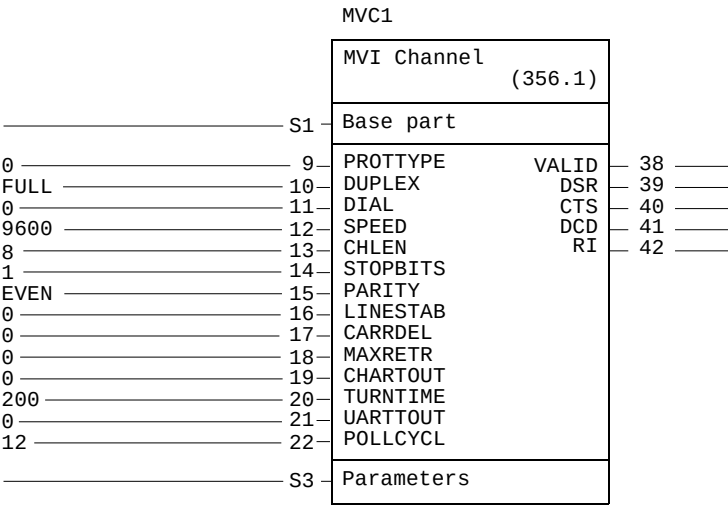


Figure 3-9. Data Base Element MVICHAN Default Values

Table 3-4. Terminal Description for MVICHAN Communication Part

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
9	PROTOTYPE	User	15	I(r/w)	PROT ocol TYPE . 15 = Allen-Bradley Half Duplex protocol	This is the only implemented type
10	DUPLEX	User	FULL	I(r/w)	DUPLEX mode, concerns modem handshake signals between CI534V04 port and modem.	Used for modem communication only
11	DIAL	User	0	B(r/w)	Not used in Allen-Bradley.	-
12	SPEED	User	9600	I(r/w)	Transmission SPEED of communication in bits/second. Values:150, 300, 600, 1200, 2400, 4800, 9600, 19200	-
13	CHLEN	User	8	I(r/w)	CH aracter LEN gth in bits.	Only 8 can be used
14	STOPBITS	User	1	I(r/w)	STOP BITS . Values: 0.5, 1, 1.5, 2	-
15	PARITY	User	NONE	I(r/w)	PARITY . Values: NONE, ODD, EVEN	-

Table 3-4. Terminal Description for MVICHAN Communication Part (Continued)

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
16	LINESTAB	User	0 for full duplex 1 for half duplex	I(r/w)	LINE STAB ilization time in number of character transmission times. Time to allow the carrier wave to stabilize before transmission of the first character. Restrictions for half duplex: "(own) LINESTAB time ≥ (opposite side) CARRDEL time". See Figure 3-11 .	0 to 15
17	CARRDEL	User	0 for full duplex 1 for half duplex	I(r/w)	CARR ier DEL ay time in number of character transmission times. Time to wait after the transmission of the last character before deactivating RTS. This delay is used to avoid destruction of the last character in the message, due to lost carrier. See Figure 3-11 .	0 to 15
18	MAXRETR	User	2	I(r/w)	MAX imum number of RETR ansmissions towards RTU before line is considered broken.	0 to 20
19	CHARTOUT	User	0	I(r/w)	CHAR acter Time-OUT time in number of character transmission times. Used by receive routine to detect idle receive line. 0: no check for time-out is made.	0 to 15
20	TURNTIME	User	100	IL(r/w)	TURN around TIME in milliseconds. Time to wait as from the last character in the command until the first character in the reply, i.e. the time-out time.	0 to 20000
21	UARTTOUT	User	1 for full duplex 2 for half duplex	I(r/w)	UART transmission Time-OUT in number of character transmission times. If half duplex is used, a check of DCD will be made by the send routine before activating RTS. If DCD is activated the send routine will wait for DCD to be deactivated up to this time before aborting the transmission.	0 to 15
22	POLLCYCL	User	96 000/SPEED	I(r/w)	Maximum time between two idle POLLING CYCLES in seconds.	0 to 255
38	VALID	System	-	B(r)	Signals DSR etc. is VALID	-
39	DSR	System	-	B(r)	Modem signal Data Set Ready .	-
40	CTS	System	-	B(r)	Modem signal Clear To Send	-
41	DCD	System	-	B(r)	Data Carrier Detect	-
42	RI	System	-	B(r)	Not used in Allen-Bradley.	-

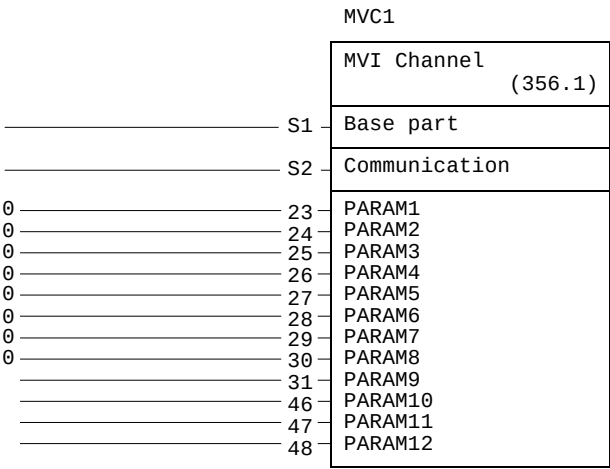


Figure 3-10. Data Base Element MVICHAN Parameters Default Values

Table 3-5. Terminal Description for MVICHAN Parameter Part

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
23	PARAM1	User		IL(r/w)	Station number for NI module	0 to 255
24	PARAM2	User	2	IL(r/w)	Retransmission towards NI	-
25	PARAM3	User	0	IL(r/w)	Checksum Type, BCC	Only implemented
26	PARAM4	User	0	IL(r/w)	NI poll cycle time in ms. To decrease the load on CI534V04 module, values greater than 0 can be used.	-
27	PARAM5	User	-	IL(r/w)	Not used in Allen-Bradley.	-
.	.	.	.	.	.	.
28	PARAM8	User	-	IL(r/w)	Not used in Allen-Bradley.	-
29	PARAM9	User	-	A20(r/w)	Not used in Allen-Bradley.	Maximum 20 characters
:	:	:	:	:	:	:
:	:	:	:	:	:	:
48	PARAM12	User	-	A20(r/w)	Not used in Allen-Bradley.	Maximum 20 characters

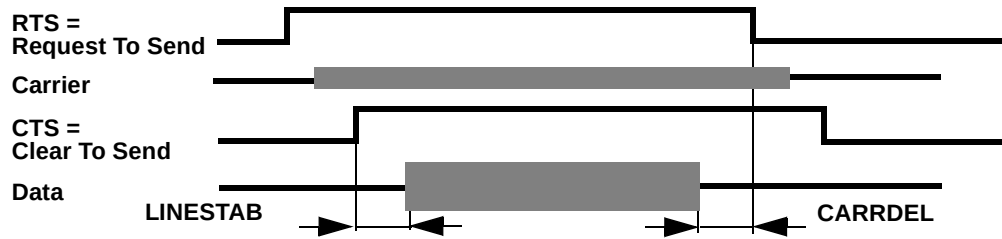


Figure 3-11. LINESTAB and CARRDEL in Half Duplex Mode

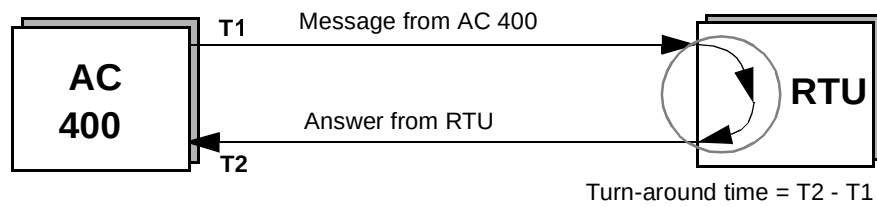


Figure 3-12. Turn-around Time

3.6.1.2 MVINODE Data Base Element

Every node on a MVI local control network is represented by a data base element of type MVINODE. The element specifies each node on the DH / DH+ / DH485.

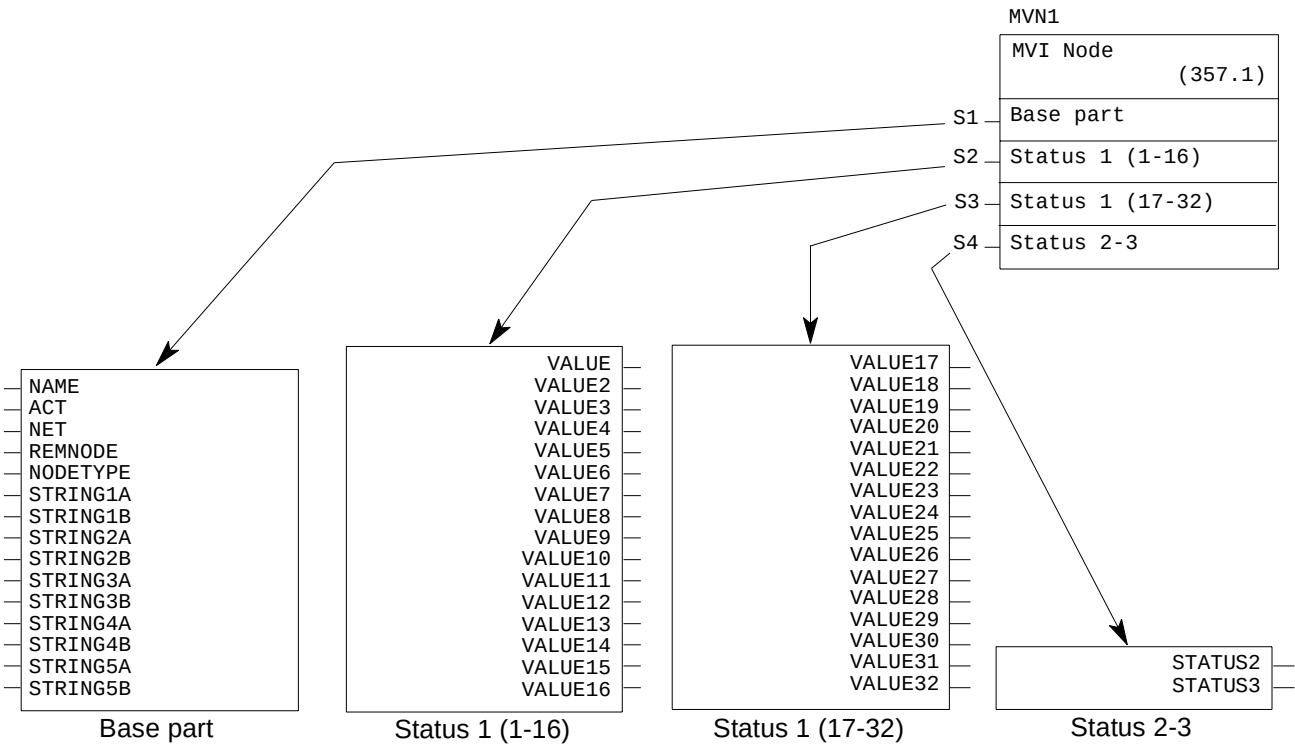


Figure 3-13. Overview of MVINODE Data Base Element

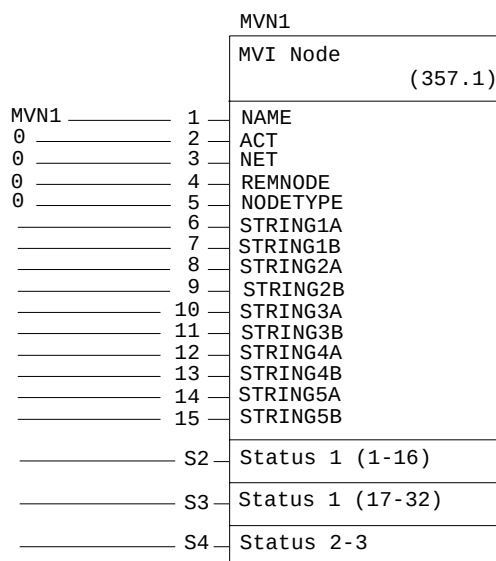


Figure 3-14. Data Base Element MVINODE Base Part for MVI - Allen-Bradley

Table 3-6. Terminal Description for MVINODE Base Part

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
1	NAME	User	MVNx	-	Unique module NAME .	Maximum 20 characters.
2	ACT	User	1	B(r/w)	0 = the element is spare 1 = the element is ACT ive	-
3	NET	User		-	NET work number of remote node.	0 to 9
4	REMNODE	User		I(r/w)	REM ote NODE number.	0 to 99
5	NODETYPE	User	0	I(r/w)	Not used in Allen-Bradley.	0 to 32767
6	STRING1A	User	-	A20(r/w)	Not used in Allen-Bradley.	Maximum 20 characters.
7	STRING1B	User	-	A20(r/w)	Not used in Allen-Bradley.	Maximum 20 characters.
:	:	:	:	:	:	:
:	:	:	:	:	:	:
14	STRING5A	User	-	A20(r/w)	Not used in Allen-Bradley.	Maximum 20 characters.
15	STRING5B	User	-	A20(r/w)	Not used in Allen-Bradley.	Maximum 20 characters.

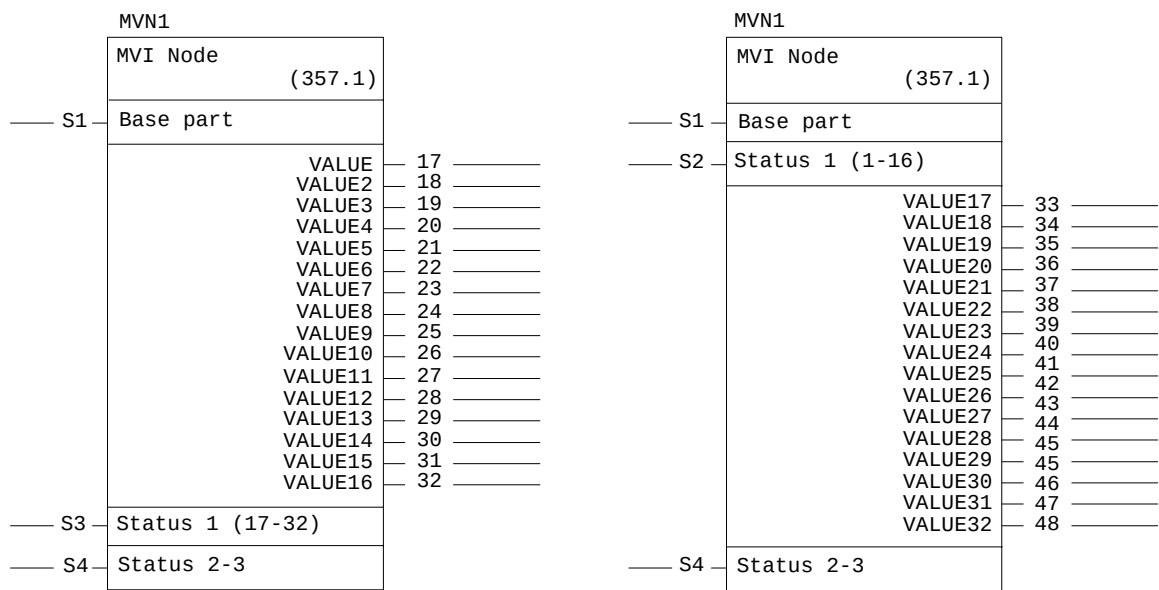


Figure 3-15. Status 1 (1-16) / Status 1 (17-32)

Status1

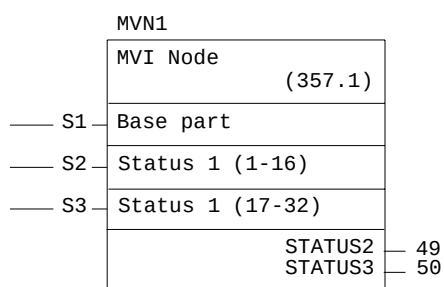
Contains information required for flow control, among other things, see [Table 3-7](#), below.

Table 3-7. Status1

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
17	VALUE	System	-	B(r)	Link status The corresponding RTU reachable, Used by the PC program for flow control see Figure 3-36 Set to "1" when the remote node is reachable. Set to "0" when contact with remote node is lost (including restart of CI534V04). The CI534V04 considers the contact lost after maximum number of retransmissions without an answer or incorrect answers.	

Table 3-7. Status1 (Continued)

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
18 : : 21	VALUE2 : : VALUE5	System : : System	- : : -	B(r) : : B(r)	Not used in Allen-Bradley. : : Not used in Allen-Bradley.	
22	VALUE6	System	-	B(r)	Ready for Message Set to "1" when no command is pending, from the application to the RTU. Set to "0" when a command is pending, from the application to the RTU. Used by the PC program for flow control, see Figure 3-36 .	
23 : : 48	VALUE7 : : VALUE32	System : : System	- : : -	B(r) : : B(r)	Not used in Allen-Bradley. : : Not used in Allen-Bradley.	



Status2 and Status3

Not used.

Table 3-8. Status2 and Status3

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
49	Status 2	System	-	IL(r/w)	Not used in Allen-Bradley.	
50	Status 3	System	-	IL(r/w)	Not used in Allen-Bradley.	

3.6.2 MVI Data Block (MVB)

The MVI Data Block element specifies either data transmission to other RTUs or commands sent locally to the protocol handler on the CI534V04. MVB data block can be configured for writing data when CI534V04 sends data to the RTU or read data when receives data from RTU. The exact value to be entered for CMDCODE, AUXINFO1, AUXINFO2, etc. is related to the specific A-B RTU and command, refer Table 3-12 and Table 3-13 for relation between command code and other entries.

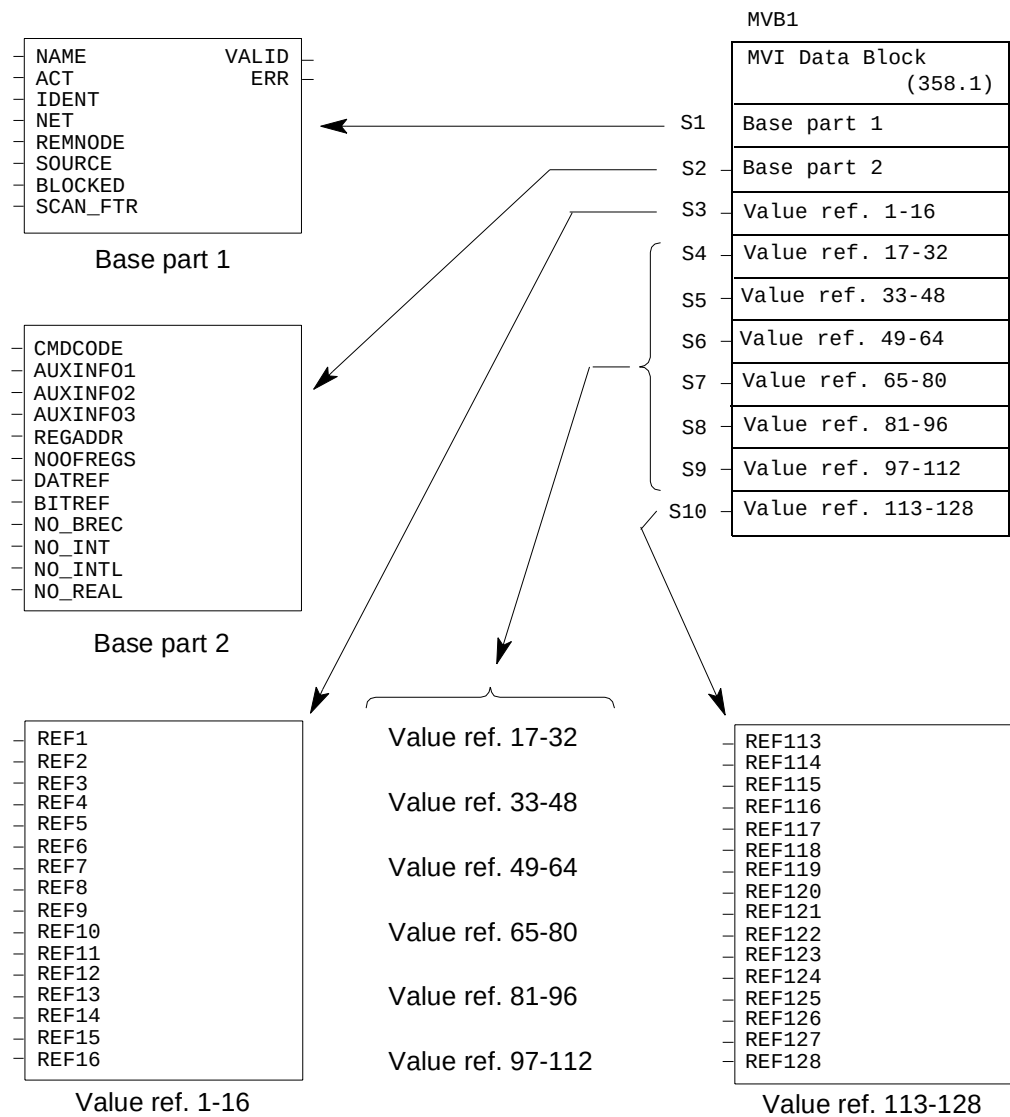


Figure 3-16. Overview of MVB Data Base Element

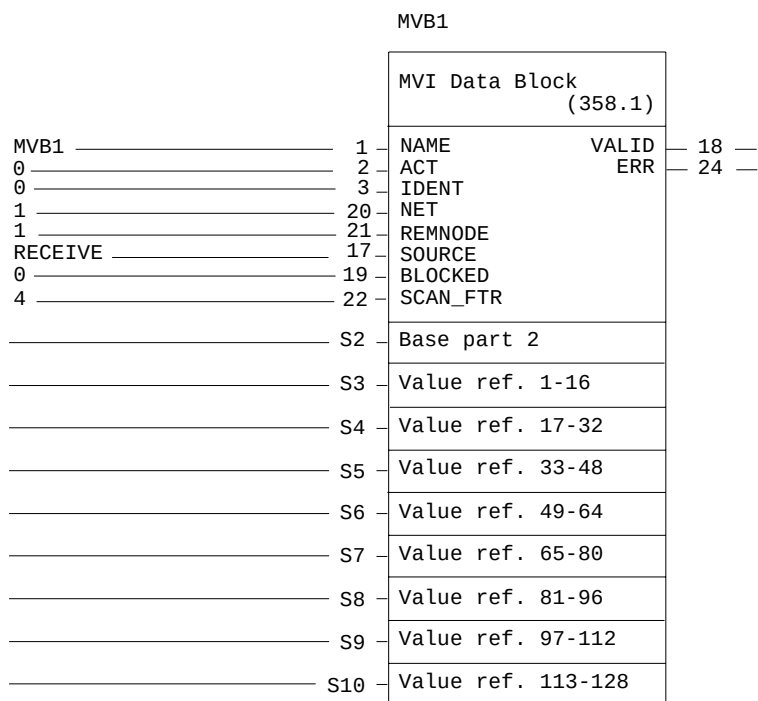


Figure 3-17. MVB Base Part 1 Default Values

Table 3-9. Terminal Description of MVB for Base Part 1

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
1	NAME	User	MVBx	—	Unique module NAME .	Maximum 20 characters.
2	ACT	User	1	B(r/w)	Element is ACT ive. 0 = Element is spare 1 = Element is active	—
3	IDENT	User	-	—	IDENT ity. A number which must be unique for a combination of NET and REMNODE.	1 to 255
20	NET	User		—	NET work number. Defined at the MVIMOD data base element for the CI534V04.	1 to 9

Table 3-9. Terminal Description of MVB for Base Part 1 (Continued)

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
21	REMNODE	User		–	REMOte NODE number. Node number of the RTU. REMNODE must be the same as in the corresponding MVINODE.	1 to 99
17	SOURCE	User		–	SOURCE . Direction of the data transmission. RECEIVE = Receiving data SEND = Sending data	–
19	BLOCKED	User	1	B(r/w)	BLOCKED . Cyclic execution of the specified command is: 0 = Not blocked 1 = Blocked	The cycle time is defined by the terminal SCAN_FTR.
22	SCAN_FTR	User	4	–	SCAN FacToR . In multiples of basic scan cycle time (default 2 seconds).	1 to 127
18	VALID	System	–	B(r/w)	VALID SOURCE = SEND: Set to 1 after the first execution of MVB. SOURCE = RECEIVE: Set to 1 after reception of DATs. If the MVB is not blocked, the terminal will be reset by the system also if no DATs are received within the supervision time of 3*SCAN_FTR basic scan cycle time.	–
24	ERR	System	–	B(r)	ERROR . Set if an error occurred. AC 400 sends a system message to indicate the nature of the problem. 0 = No error 1 = Error	–

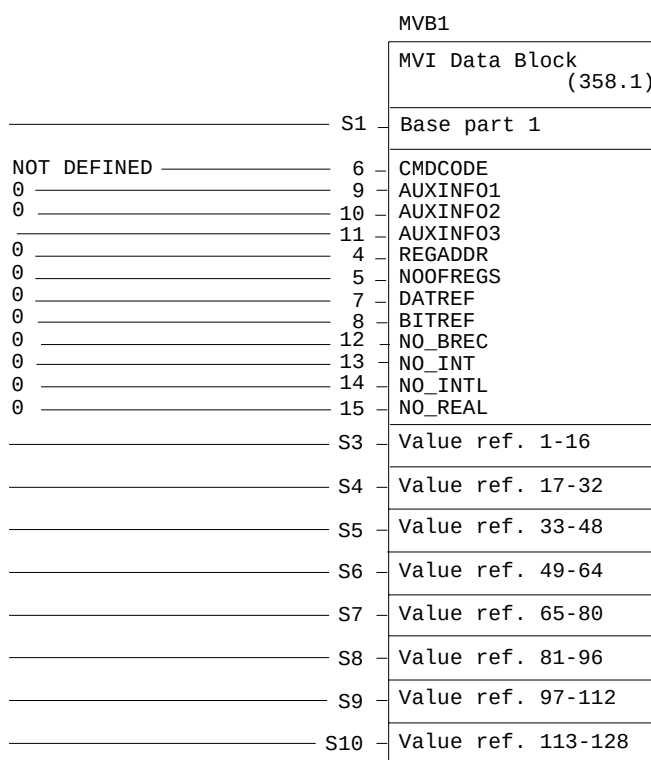


Figure 3-18. MVB Base Part 2 Default Values

Table 3-10. Terminal Description of MVB for Base Part 2

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
6	CMDCODE	User	-	—	CoMmand CODE to be executed. RESTART HANDLER READ I WRITE I WRITE MIX L	See Table 3-12 and Table 3-13
9	AUXINFO1	User	-	IL(r/w)	AUXiliary INfOrmatIOn1. 2: PLC2 5: PLC5 500: SLC500	See Table 3-12 and Table 3-13

Table 3-10. Terminal Description of MVB for Base Part 2 (Continued)

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
10	AUXINFO2	User	-	IL(r/w)	AUXiliary INFORMATION 2 0: Unprotected 1: Protected	See Table 3-12 and Table 3-13 Protected mode used only for PLC2
11	AUXINFO3	User	–	A20(r/w)	AUXiliary INFORMATION 3 PLC2: Not used PLC5: Logical addressing SLC500: Logical addressing Logical addressing is the file name used for logical addressing in RTU.	See Table 3-12 and Table 3-13
4	REGADDR	User		REF1	REG ister start ADDR ess for first DAT reference in the MVB.	0 to 2 ³¹
5	NOOFREGS	User		I(r/w)	NO OF REG ister S . Number of registers to be transferred.	
7	DATREF	User	0	I(r/w)	DAT REF erence in this element (max 110 for DAT(B), 128 for DAT(I)).	0 to 110 or 0 to 128 0 indicates that the terminal is not used.
8	BITREF	User	0	I(r/w)	Not used in Allen-Bradley.	
12	NO_BREC	User		–	Number Of Boolean REC ords DAT(B).	0 to 110
13	NO_INT	User		–	Number Of INT eger records DAT(I).	0 to 128
14	NO_INTL	User		–	Not used in Allen-Bradley.	
15	NO_REAL	User		–	Not used in Allen-Bradley.	

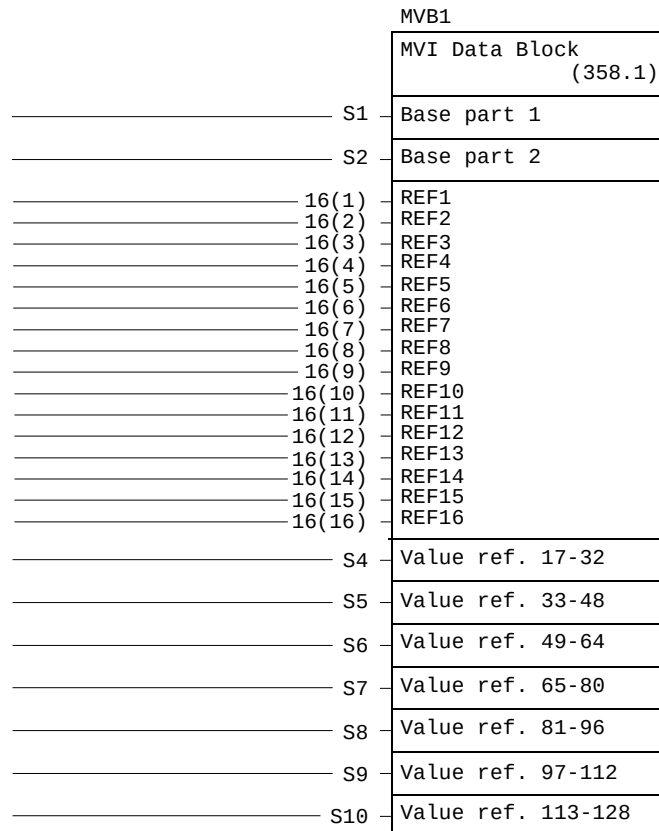


Figure 3-19. Value Reference 1-16

The value references 17-128 are analogous to Value ref. 1-16

Table 3-11. Terminal Description for MVB Value Ref. 1 - 128

Terminal No.	Terminal Name	Value entered by	Recommended Value	PC Connection Data Type	Description	Remarks
16(1)	REF1	User	-	—	REFERENCE: Name of connected DAT element (number 1).	If an MVB has the name "MVB1" and NO_BREC or NO_INT has the value 1, the name of the connected DAT elements will be: MVB1.B1 or MVB1.I1
16(2)	REF2	User	-	—	REFERENCE: Name of connected DAT element (number 2).	
:	:	:	:	:	:	
16(128)	REF128	User	-	-	REFERENCE: Name of connected DAT element (number 128).	

3.6.2.1 Command Code Usage

A MVI A-B command is described with a combination of MVB terminals CMDCODE, AUXINFO1 and AUXINFO2. Refer [Table 3-12](#) and [Table 3-13](#) for various command codes supported by CI534V04 and related entries of CMDCODE, AUXINFO1 and AUXINFO2. Also refer [Section 3.6.4.1, Restart Handler Command](#).

3.6.2.2 Register Address Usage

The MVB data base element terminals REGADDR, NOOFREGS, AUXINFO3 and DATREF are used together to address all or part of the references held by a MVB data base element.

The terminal REGADDR is the address for the register held by the first DAT reference to an DAT(I) or the first register (VALUE) of the first DAT reference to a DAT(B), considering AUXINFO3 element number is zero. If the element number is not zero, then the sum of REGADDR and the element number will be the address.

The terminal NOOFREGS is the number of registers to read or write. NOOFREGS = 0 (zero) is not allowed for a MVB data base element used for A-B command.

The terminal DATREF is the index of the first DAT reference to be read or write. DATREF = 1 refers to the first DAT references of the MVB data base element, DATREF = 0 indicates that this terminal is not used.

For the terminal AUXINFO3 refer the following [Section 3.6.2.3, Logical Addressing](#) and [Section 3.6.2.4, Address Mapping](#).

3.6.2.3 Logical Addressing

The terminal AUXINFO3 contains the logical address used for A-B PLC5 and A-B SLC500 type of RTU. Take an example for logical address of A-B PLC5 or SLC500:

N7:200 means that N is the file type (Integer), 7 is the file number and 200 is the element number (with 2 byte information).

For A-B PLC5 address for a file can be between Nx:0 to Nx:999 and for A-B SLC500 address can be between Nx:0 to Nx:255, where x is the file number. For detailed information regarding logical addressing refer DF1 protocols and reference manual of A-B.

3.6.2.4 Address Mapping

Address mapping is defined as the position of register in the RTU from/to which data is to be read or written.

Address Mapping for A-B PLC2:

For A-B PLC2 address mapping is depends on the DATREF and REGADDR terminals entry of MVB data base element, AUXINFO3 is not used for A-B PLC2. When the MVB terminals set as REGADDR = 0 and DATREF = 4, then MVB will read/write to the RTU at register address 4 or if REGADDR = 4 and DATREF = 0 then also MVB will read/write to the RTU at register address 4. For entry of other terminals in the MVB and more information see [Section 3.6.2.6, Examples](#).

Address Mapping for Allen-Bradley PLC5 and SLC500:

For A-B PLC5 and A-B SLC500 address mapping is depends on the DATREF, REGADDR and AUXINFO3 of MVB data base element. N7:0 is the file name defined in RTU and we want to read/write at 11 th element of the file N7:0 (that is N7:10), this can be done as follows -

- a. By making MVB terminals entry AUXINFO3 = N7:0, REGADDR = 0 and DATREF = 11
- b. By making MVB terminals entry AUXINFO3 = N7:10, REGADDR = 0 and DATREF = 0
- c. By making MVB terminals entry AUXINFO3 = N7:0, REGADDR = 10 and DATREF = 0
- d. By using combination of AUXINFO3, REGADDR and DATREF MVB terminals for different values, for example AUXINFO3 = N7:2, REGADDR = 4 and DATREF = 5

When we are using DATREF terminal entry (case a. and case d.) for address mapping then it should be consider that the value entered for DATREF will be the word offset in RTU as well as in MVB DAT Reference. See examples for more details given in the [Section 3.6.2.6, Examples](#).

A recommendation is to use AUXINFO3 as the start of the datablock in the RTU and to use DATREF to address the actual data and to set REGADDR to 0.

3.6.2.5 Data Transfer

The MVB data base element is used for transfer of data between nodes. It is used to be send a command and to hold the data. For a MVB data base element which is used to send a command, BLOCKED should always be set to 1 and command has to be sent event driven by using the SENDREQ PC element.

ACT is used to activate/deactivate a MVB data base element. When ACT = 0 (zero), MVB data base element is deactivated and is considered to be spare in the data base and the MVB data base element could not be sent and/or updated. If ACT = 1 the MVB data base element is activated and the MVB data base element could be sent and/or updated.

3.6.2.6 Examples

Enter values for the elements NET, REMNODE etc. as per the RTU configuration and also the type of command to be used, in following examples the type of command related to a particular type of A-B PLC are assumed to be configured for NET = 9 and REMNODE = 2.

Allen-Bradley PLC2 Unprotected Read

Consider the communication between an Advant Controller 400 and a remote node where the Advant Controller 400 wants to read first word (two bytes) from the RTU using Allen-Bradley PLC2 command Unprotected Read, see Figure 3-20. A MVB data base element will be used where CMDCODE = READ I, AUXINFO1 = 2, AUXINFO2 = 0, REGADDR = 0, NOOFREGS = 1 and SOURCE = RECEIVE.

The data which is read from RTU address 0 will be stored in REF1 of the MVB.

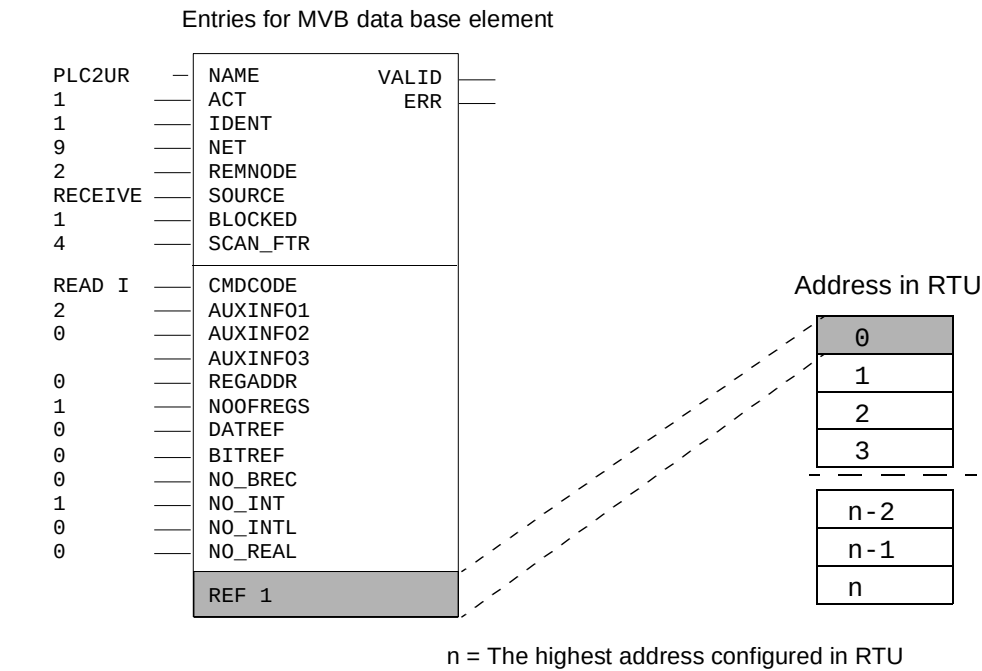


Figure 3-20. Advant Controller 400 reads First Word from RTU

Allen-Bradley PLC2 Unprotected Write

Consider the communication between an Advant Controller 400 and a remote node where the Advant Controller 400 wants to write one word to the address 10 of the RTU using Allen-Bradley PLC2 command Unprotected Write, see [Figure 3-21](#). A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1 = 2, AUXINFO2 = 0, REGADDR = 10, NOOFREGS = 1 and SOURCE = SEND.

The data which is stored in REF1 of the MVB will be sent to RTU at address 10.

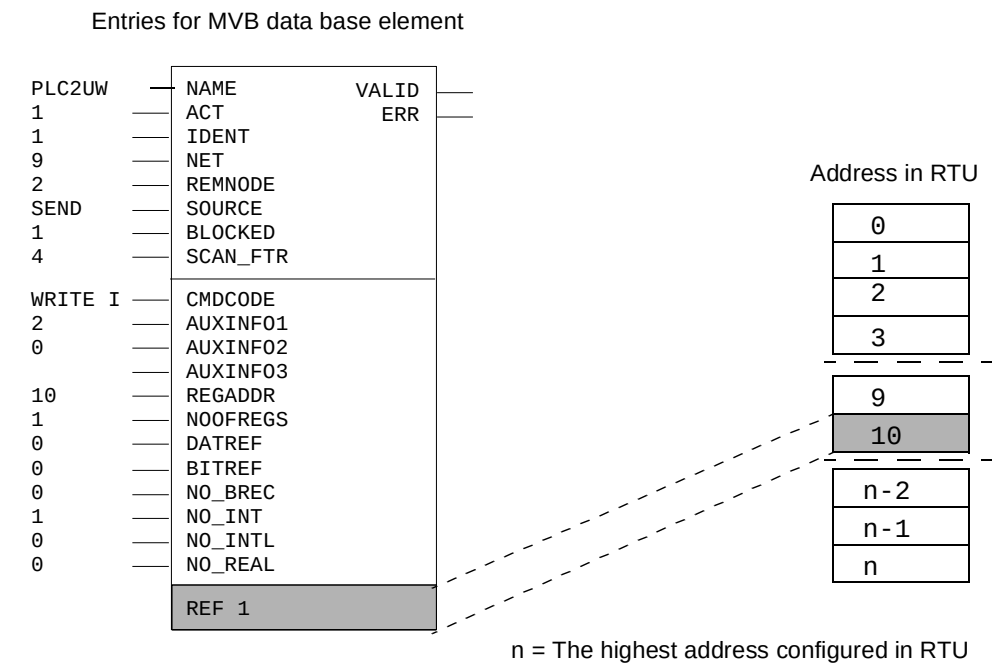


Figure 3-21. Advant Controller 400 writes One Word to the RTU

Allen-Bradley PLC2 Unprotected Write with DATREF

DATREF can be used to address part of the references in the MVB data base element, see [Figure 3-22](#). In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC2 command Unprotected Write to write the 5 words to the RTU address 10 to 14. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1 = 2, AUXINFO2 = 0, REGADDR = 0, NOOFREGS = 5, DATREF = 11 and SOURCE = SEND.

The data which is stored in REF11 to REF15 of the MVB will be sent to RTU at address 10 to 14 correspondingly.

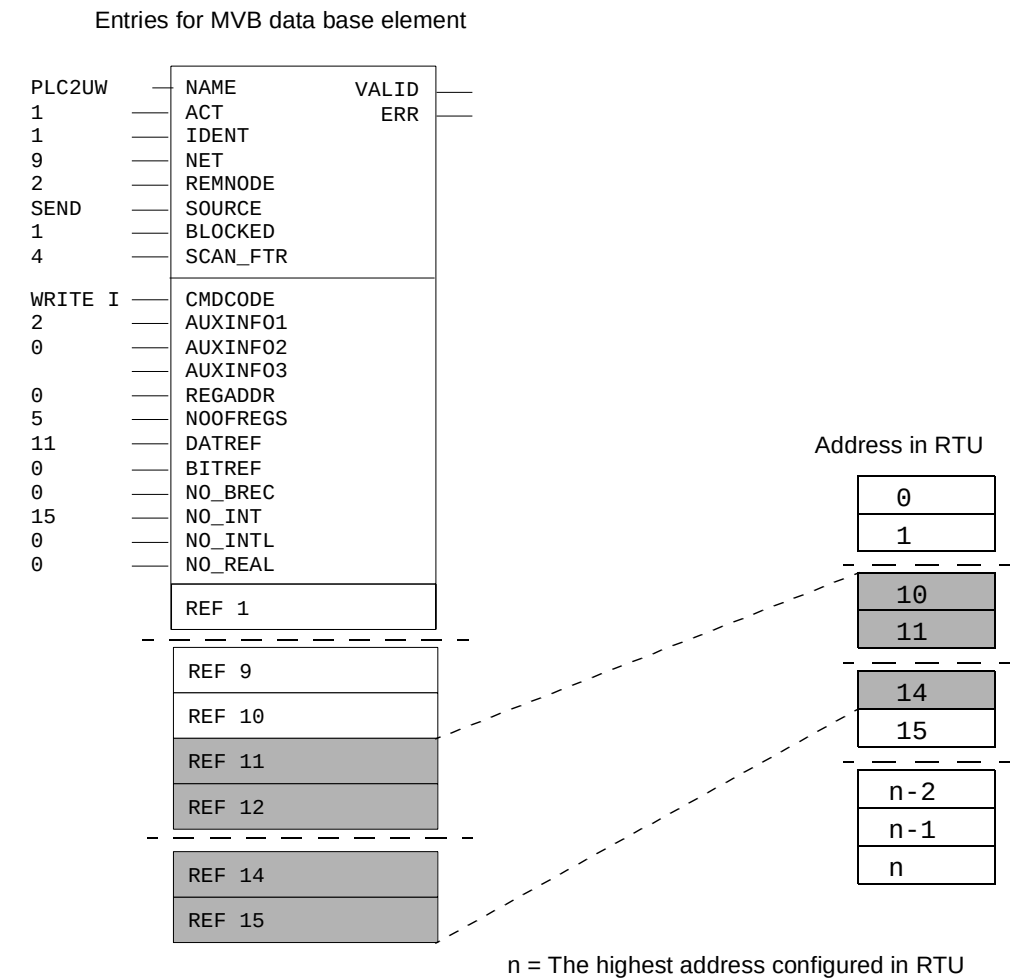


Figure 3-22. Advant Controller 400 writes Five Words to the RTU

Allen-Bradley PLC2 Unprotected Bit Write

Consider the communication between an Advant Controller 400 and a remote node where the Advant Controller 400 wants to manipulate bits in first byte of the RTU by using one 8 bit set mask and one 8 bit reset mask. Command used is Allen-Bradley PLC2 Unprotected Bit Write, see Figure 3-23. A MVB data base element will be used where CMDCODE = WRITE MIX L, AUXINFO1 = 2, AUXINFO2 = 0, REGADDR = 0, NOOFREGS = 1, SOURCE = SEND.

The set mask = REF1: VALUE - VALUE8, where VALUE is the LSB of set mask and the reset mask = REF1: VALUE9 - VALUE16, where VALUE9 is the LSB of reset mask.¹

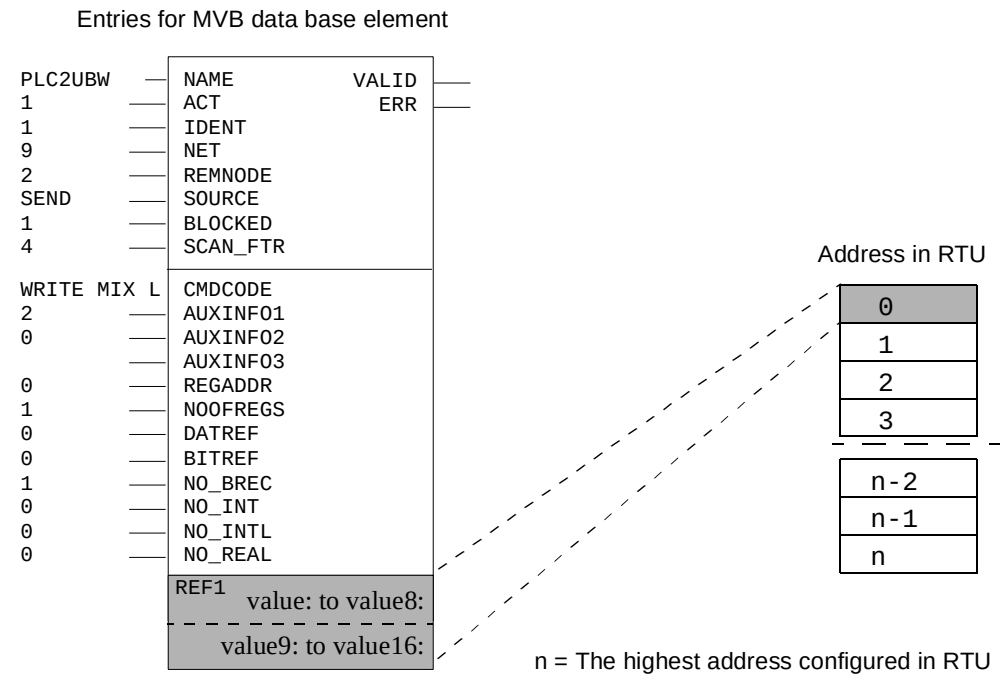


Figure 3-23. Advant Controller 400 manipulate One Byte of Data to the RTU

1. VALUE17 to VALUE32 are not used for the Bit Write Commands.

Allen-Bradley PLC2 Protected Bit Write

Consider the communication between an Advant Controller 400 and a remote node where the Advant Controller 400 wants to manipulate bits in third byte of the RTU by using one 8 bit set mask and one 8 bit reset mask. Command used is Allen-Bradley PLC2 Protected Bit Write, see Figure 3-24. A MVB data base element will be used where CMDCODE = WRITE MIX L, AUXINFO1 = 2, AUXINFO2 = 1, REGADDR = 0, NOOFREGS = 1, SOURCE = SEND.

The set mask = REF3: VALUE - VALUE8, where VALUE is the LSB of set mask and the reset mask = REF3: VALUE9 - VALUE16, where VALUE9 is the LSB of reset mask.¹

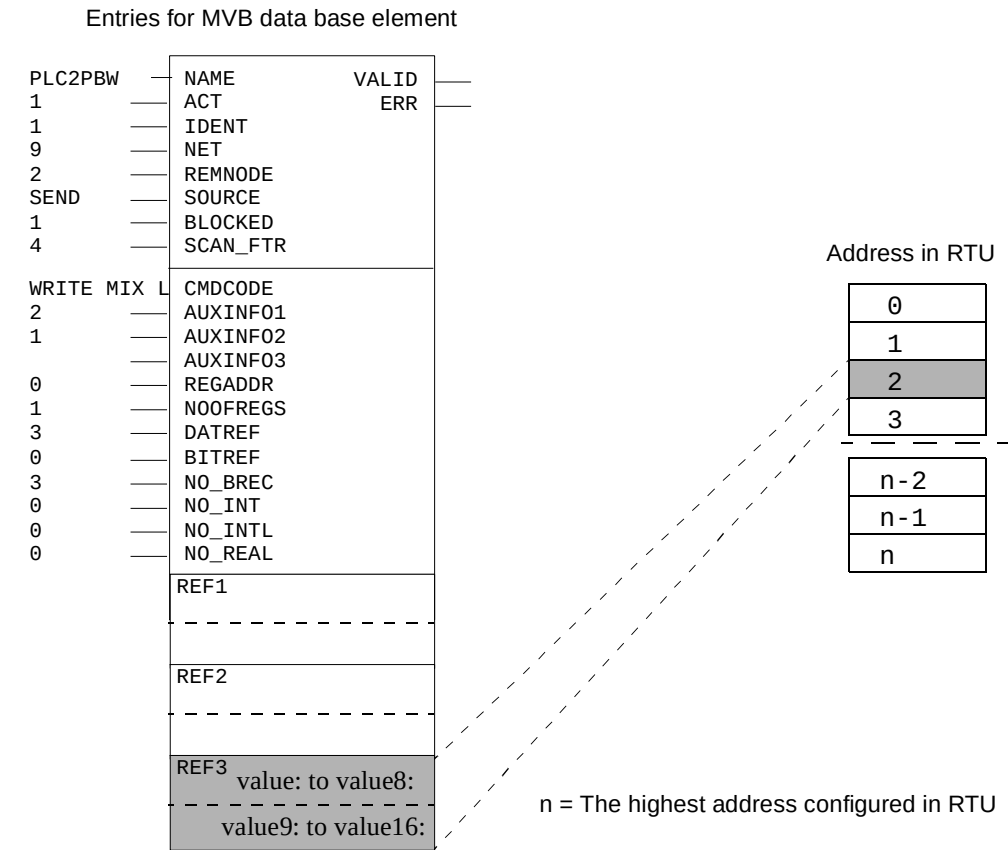


Figure 3-24. Advant Controller 400 manipulate One Byte of Data to the RTU

1. VALUE17 to VALUE32 are not used for the Bit Write Commands.

Allen-Bradley PLC5 Word Range Read

In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC5 command Word Range Read to read the 10 words, corresponding to RTU address N7:0 to N7:9, where N7 is the logical file address of A-B PLC5. A MVB data base element will be used where CMDCODE = READ I, AUXINFO1= 5, AUXINFO2 = 0, AUXINFO3 = N7:0, REGADDR = 0, NOOFREGS = 10, DATREF = 0 and SOURCE = RECEIVE.

The data which is at address 0 to 9 in RTU file N7 will be stored in REF1 to REF10 of the MVB correspondingly.

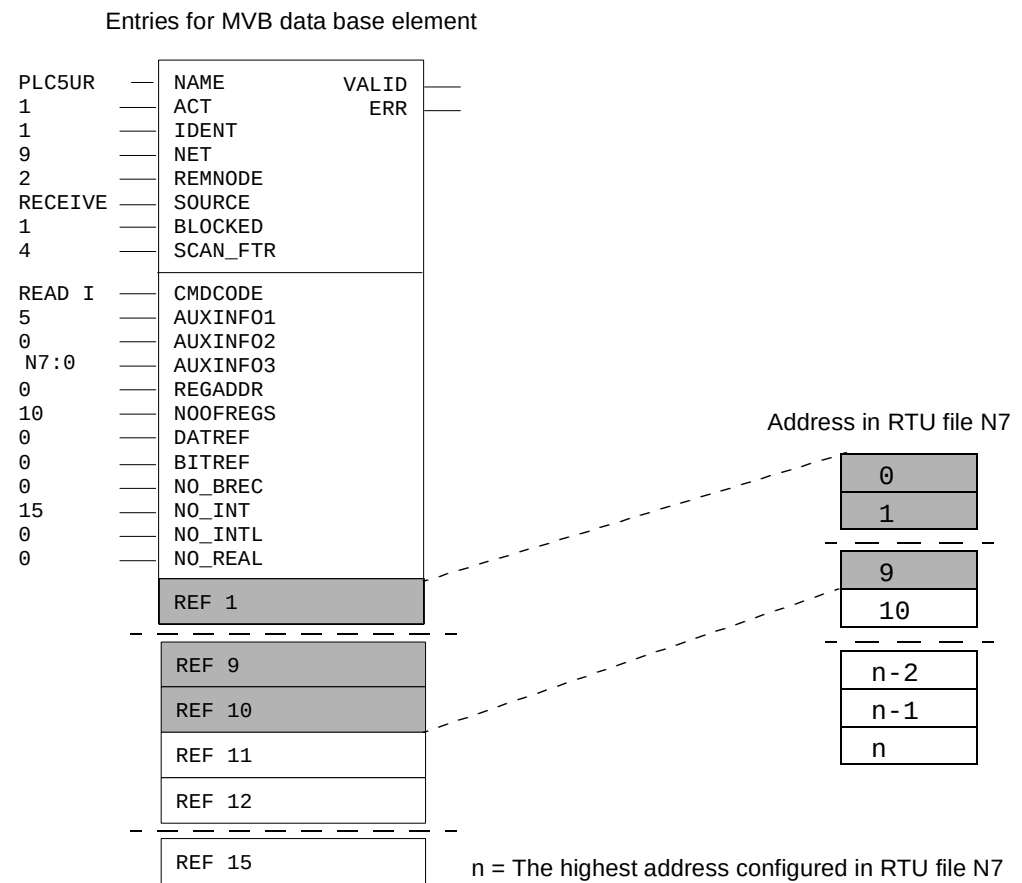


Figure 3-25. Advant Controller 400 reads Ten Words from the RTU

Allen-Bradley PLC5 Word Range Write

In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC5 command Word Range Write to write 10 words to RTU address N7:0 to N7:9, where N7 is the logical file name of PLC5. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1 = 5, AUXINFO2 = 0, AUXINFO3 = N7:0, REGADDR = 0, NOOFREGS = 10, DATREF = 0 and SOURCE = SEND.

The data which is stored in REF1 to REF10 of the MVB PLC5WRW will be sent to RTU at address 0 to 9 in file N7.

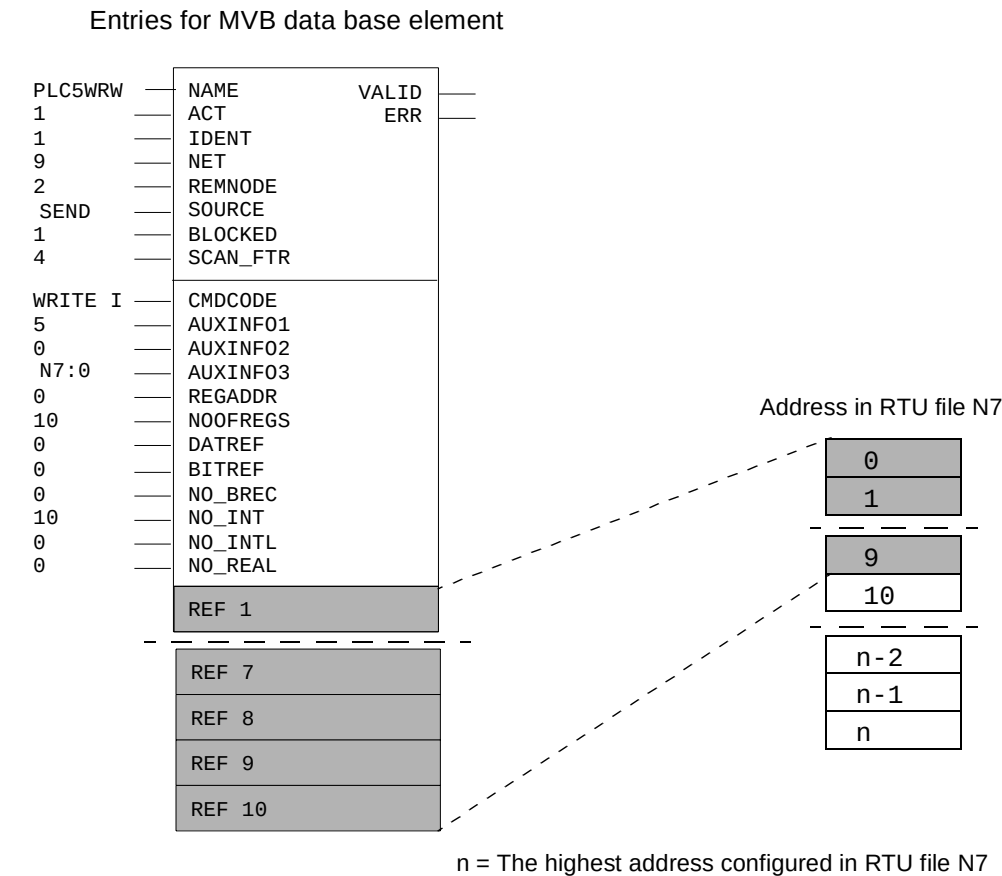


Figure 3-26. Advant Controller 400 writes Ten Words to the RTU

Allen-Bradley PLC5 Word Range Write with RTU Word Offset

PLC5 logical file addressing can be used to address specific RTU registers, see [Figure 3-27](#). In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC5 command Word Range Write to write the 10 words, corresponding to MVB DAT reference 1 to 10, to the RTU address 5 to 14 in N7 file. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1= 5, AUXINFO2 = 0, AUXINFO3 = N7:5, REGADDR = 0, NOOFREGS = 10, DATREF = 0 and SOURCE = SEND.

The data which is stored in REF1 to REF10 of the MVB PLC5UW1 will be sent to RTU at address 5 to 14 in N7 file correspondingly.

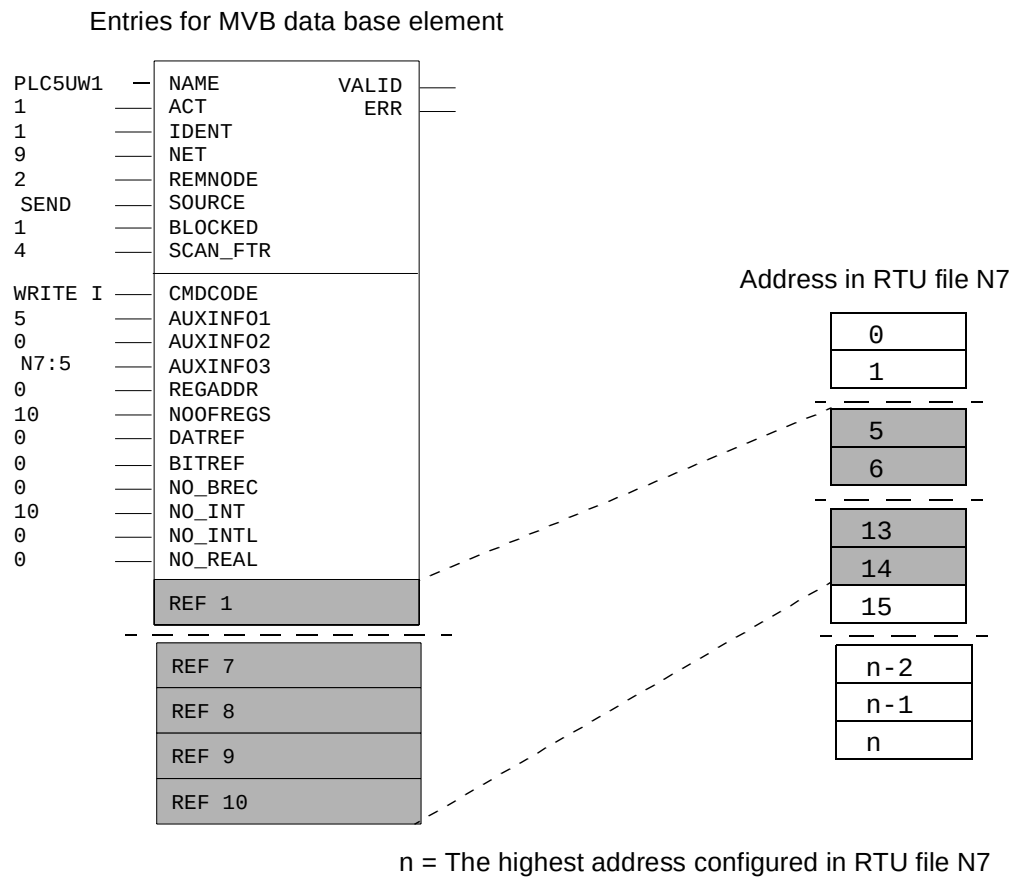


Figure 3-27. Advant Controller 400 writes the Ten Words to the RTU

Allen-Bradley PLC5 Word Range Write with DATREF

DATREF can be used to address part of the references in the MVB data base element. In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC5 command Word Range Write to write the 8 words to the RTU address 12 to 19. A MVB data base element will be used where CMDCODE= WRITE I, AUXINFO1= 5, AUXINFO2 = 0, AUXINFO3 = N7:0, REGADDR = 0, NOOFREGS = 8, DATREF = 13 and SOURCE = SEND.

The data which is stored in REF13 to REF20 of the MVB PLC5UW2 will be sent to RTU at address 12 to 19 in N7 file correspondingly.

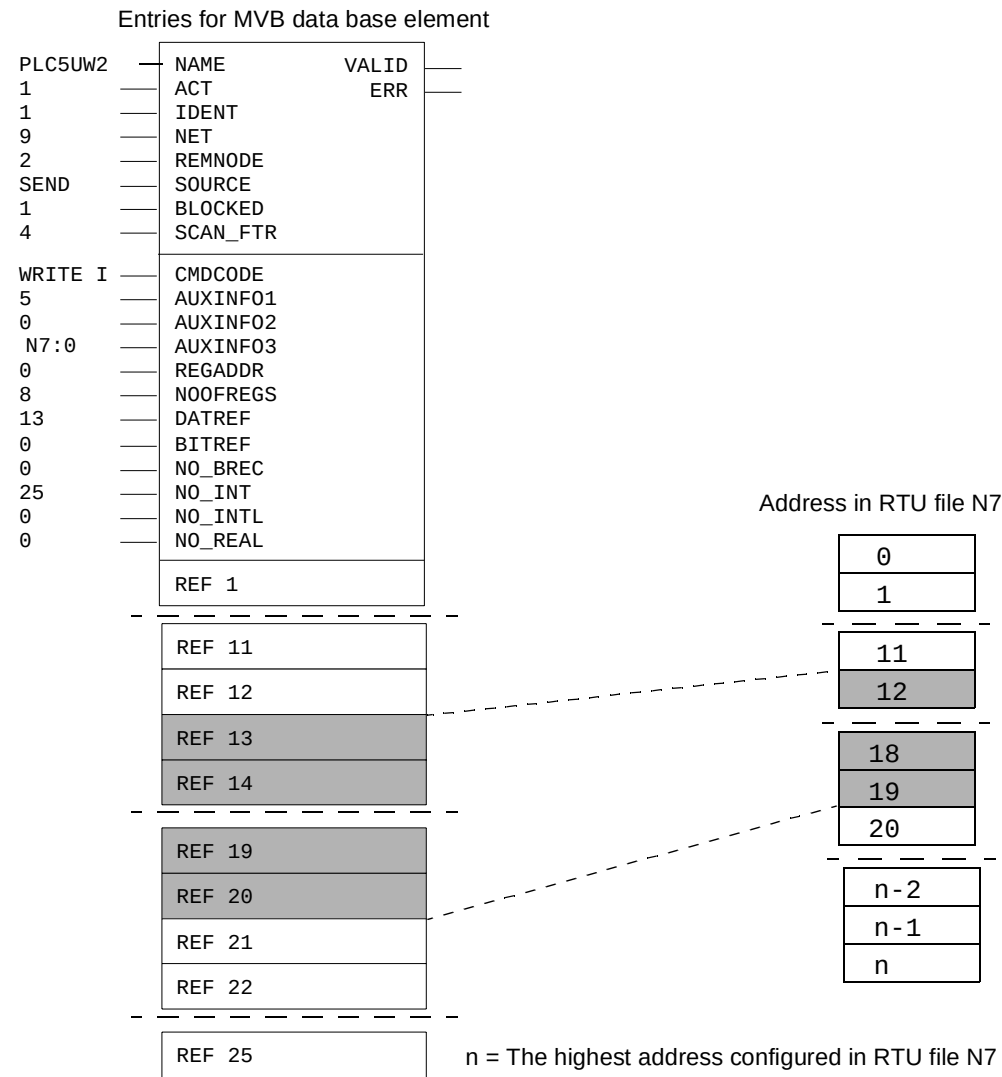


Figure 3-28. Advant Controller 400 writes the Eight Words to the RTU

Allen-Bradley PLC5 Word Range Write with DATREF and REGADDR

PLC5 logical file addressing can be used to address specific RTU registers, see [Figure 3-29](#). In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC5 command Word Range Write to write the 10 words, corresponding to MVB DAT reference 3 to 12, to the RTU address 7 to 16 in file N7. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1= 5, AUXINFO2 = 0, AUXINFO3 = N7:0, REGADDR = 5, NOOFREGS = 10, DATREF = 3, and SOURCE = SEND.

The data which is stored in REF3 to REF12 of the MVB PLC5WRW will be sent to RTU at address 7 to 16 in N7 file correspondingly.

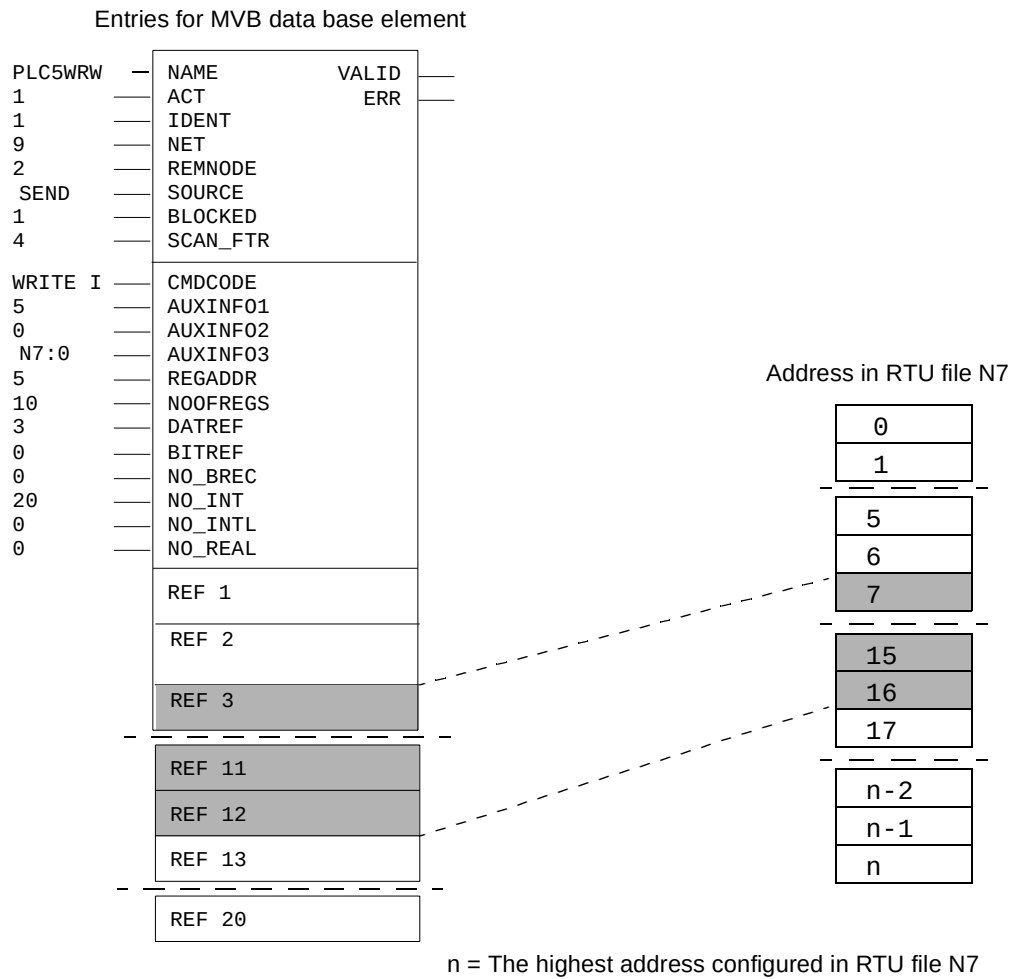


Figure 3-29. Advant Controller 400 writes the Ten Words to the RTU

Allen-Bradley PLC5 Word Range Write with RTU Word Offset, DATREF and REGADDR

PLC5 logical file addressing can be used to address specific RTU registers, see [Figure 3-30](#). In this example, Advant Controller 400 uses MVI - Allen-Bradley PLC5 command Word Range Write to write the 10 words, corresponding to MVB DAT reference 3 to 12, to the RTU address 10 to 19 in file N7. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1= 5, AUXINFO2 = 0, AUXINFO3 = N7:5, NOOFREGS = 10, DATREF = 3, REGADDR = 3, and SOURCE = SEND.

The data which is stored in REF3 to REF12 of the MVB PLC5UW3 will be sent to RTU at address 10 to 19 in N7 file correspondingly.

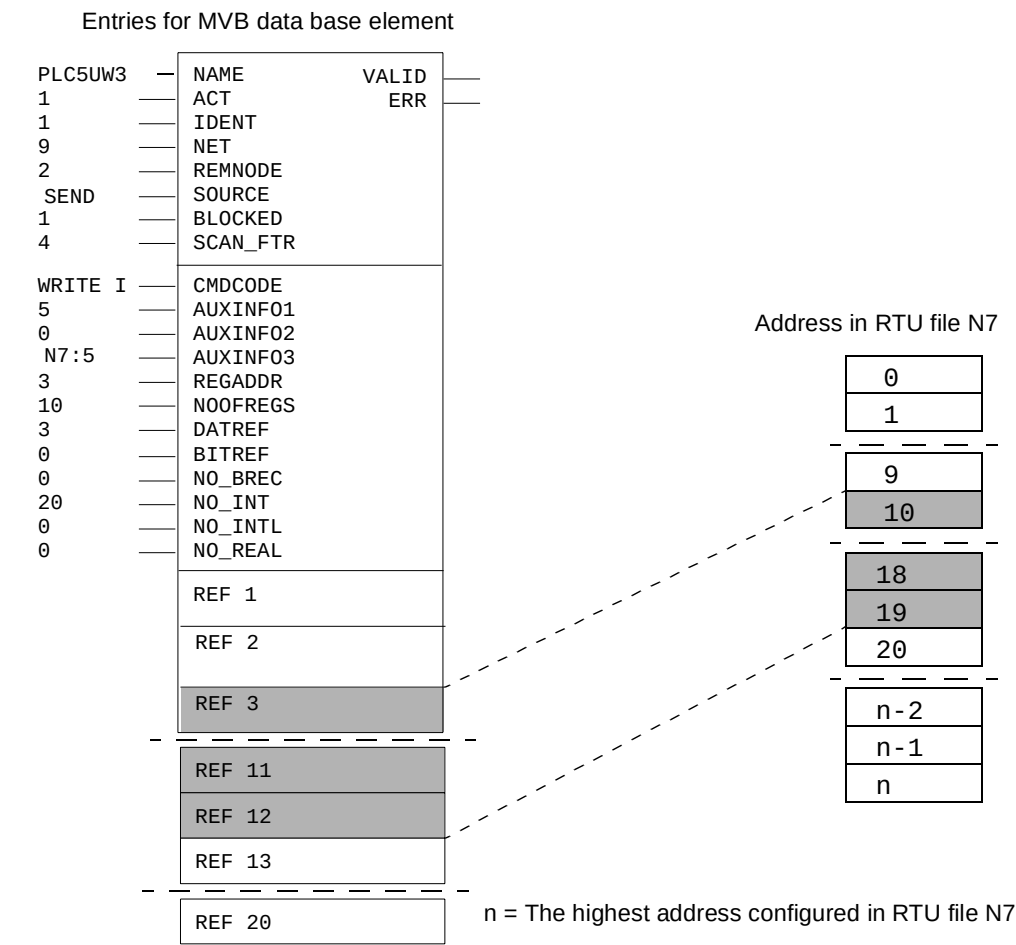


Figure 3-30. Advant Controller 400 writes the Ten Words to the RTU

Allen-Bradley SLC500 Protected Typed Logical Read

In this example, Advant Controller 400 uses MVI - Allen-Bradley SLC500 command Protected Typed Logical Read to read the 15 words, corresponding to RTU address N7:0 to N7:14, where N7 is the logical file address of SLC500. A MVB data base element will be used where CMDCODE = READ I, AUXINFO1= 500, AUXINFO2 = 0, AUXINFO3 = N7:0, REGADDR = 0, NOOFREGS = 15, DATREF = 0 and SOURCE = RECEIVE.

The data which is at RTU address 0 to 14 in N7 file will be stored in REF1 to REF15 of the MVB SLC5PR.

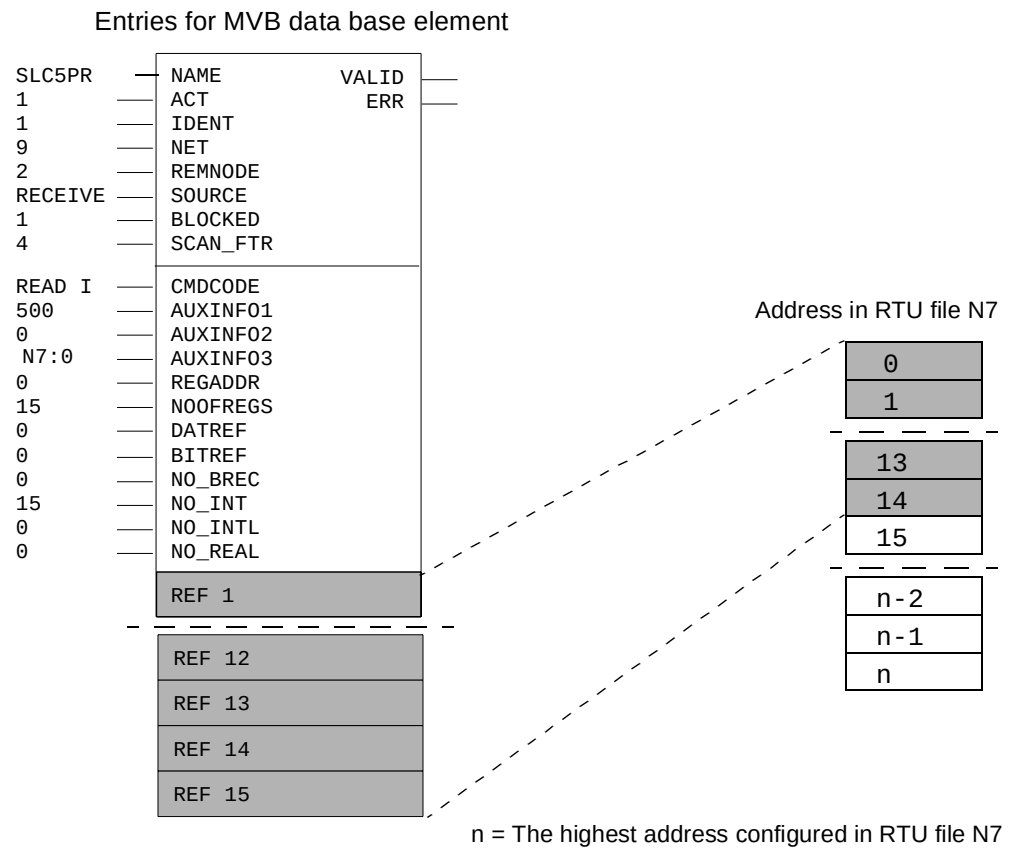


Figure 3-31. Advant Controller 400 reads Fifteen Words from the RTU

Allen-Bradley SLC500 Protected Typed Logical Write

In this example, Advant Controller 400 uses MVI - Allen-Bradley SLC500 command Protected Typed Logical Write to write 3 words, to RTU register address N7:0 to N7:2, where N7 is the logical File address of SLC500. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1 = 500, AUXINFO2 = 0, AUXINFO3 = N7:0, REGADDR = 0, NOOFREGS = 3, DATREF = 0 and SOURCE = SEND.

The data which is stored in REF1 to REF3 of the MVB SLC5PW will be sent to RTU at address 0 to 2 in N7 file correspondingly.

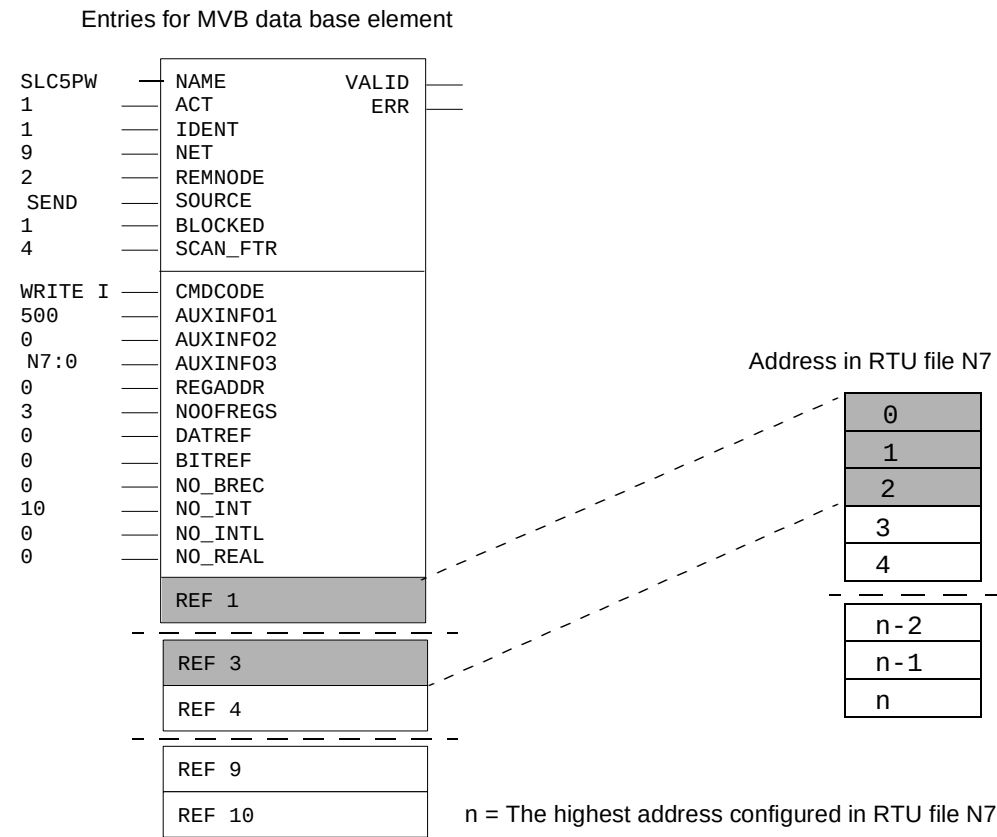


Figure 3-32. Advant Controller 400 writes Three Words to the RTU

Allen-Bradley SLC500 Protected Typed Logical Write with RTU Word Offset, DATREF and REGADDR

SLC500 logical file addressing can be used to address specific RTU registers, see [Figure 3-33](#). In this example, Advant Controller 400 uses MVI - Allen-Bradley SLC500 command Protected Typed Logical Write to write the 8 words, corresponding to MVB DAT reference 4 to 11, to the RTU address 19 to 26 in file N7. A MVB data base element will be used where CMDCODE = WRITE I, AUXINFO1= 500, AUXINFO2 = 0, AUXINFO3 = N7:14, NOOFREGS = 8, DATREF = 4, REGADDR =2, and SOURCE = SEND.

The data which is stored in REF4 to REF11 of the MVB SLCPW1 will be sent to RTU at address 19 to 26 in N7 file correspondingly.

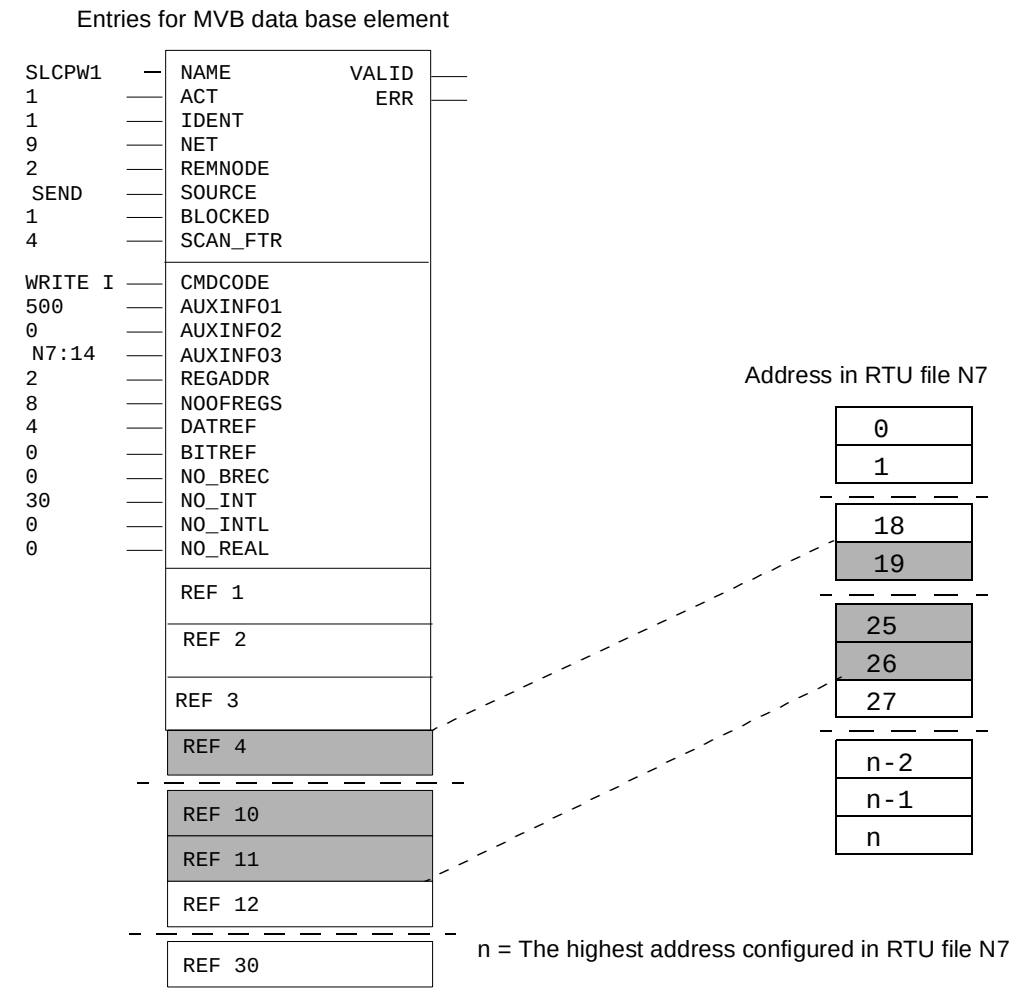


Figure 3-33. Advant Controller 400 writes the Eight Words to the RTU

3.6.3 Command MVB Data Base Elements

This section describes the use of MVB data base element to control the data transfer. All MVB data base elements must be included in the send sequence according to [Section 3.6.5.1, Type Circuits for MVI - Allen-Bradley Data Flow Control](#).

These MVB data base elements are used by the application program to activate Read and Write Commands from CI534V04 to the corresponding RTU.

3.6.3.1 Read Command

To update a value in Advant Controller 400, Read Command must be issued to the corresponding RTU, A number of MVB data base elements, configured to send MVI-Allen-Bradley command are used for this purpose, See [Table 3-12](#).

Table 3-12. Configuration of MVB Data Base Element for Allen-Bradley Read Commands

Allen-Bradley Command	CMD CODE	AUXINFO1	AUXINFO2	AUXINFO3	Reg Offset
PLC2 Unprotected Read	READ I	2	0	Not used	Word Offset
PLC5 Word Range Read	READ I	5	0	Logical file addressing	Word Offset
SLC500 Protected Typed Logical Read	READ I	500	0	Logical file addressing	Word Offset

The data returned by the RTU is received by the MVB data base element and written to the corresponding DAT elements.

3.6.3.2 Write Command

To update a value in a RTU, a Write Command must be issued to the corresponding RTU. A number of MVB data base elements, configured to send MVI - Allen-Bradley commands are used for this purpose. See [Table 3-13](#).

Table 3-13. Configuration of MVB Data Base Element for Allen-Bradley Write Commands

Allen-Bradley Command	CMD CODE	AUXINFO1	AUXINFO2	AUXINFO3	Reg Offset
PLC2 Protected Write	WRITE I	2	1	Not used	Word Offset
PLC2 UnProtected Write	WRITE I	2	0	Not used	Word Offset
PLC2 UnProtected Bit Write	WRITE MIX L	2	0	Not Used	Byte offset
PLC2 Protected Bit Write	WRITE MIX L	2	1	Not Used	Byte offset
PLC5 Word Range Write	WRITE I	5	0	Logical file addressing	Word Offset
SLC500 Protected Typed Logical Write	WRITE I	500	0	Logical file addressing	Word Offset

The data sent to the RTU unit is issued by the MVB data base element and fetched from the corresponding DAT elements.

3.6.4 MVB Data Base Elements for Control Commands

This section describes the use of the MVB data base element for control commands directed to CI534V04 itself.

3.6.4.1 Restart Handler Command

To restart one communication channel, a restart handler command is sent from the application. A MVB data base element is used for this purpose. See [Table 3-14](#).

Table 3-14. Configuration of MVB Data Base Element for Restart Handler Command.

CMDCODE	AUXINFO1	AUXINFO2	AUXINFO3
RESTART HANDLER	0	0	Not Used

The network number (NET) defined in the MVIMOD element s used to identify the communication channel which is to be restarted.

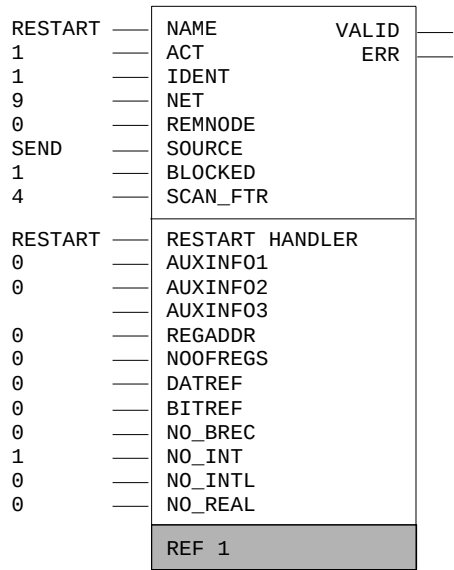


Figure 3-34. Advant Controller 400 RESTART HANDLER Command

3.6.5 PC Program Layout

To control the data flow on the asynchronous communication link, you must build a PC program in the Advant Controller 400. The PC program receives status information from CI534V04. The flow control is maintained through a chain of SENDREQ PC elements, each corresponding to a MVB data base element to be transmitted (see [Figure 3-36](#)). Include all SENDREQ PC elements with MVB data base element addressed to the same RTU in the same chain to ensure a correct flow control to the MVI - Allen-Bradley asynchronous link. Use the PC program to control the MVB data base element.

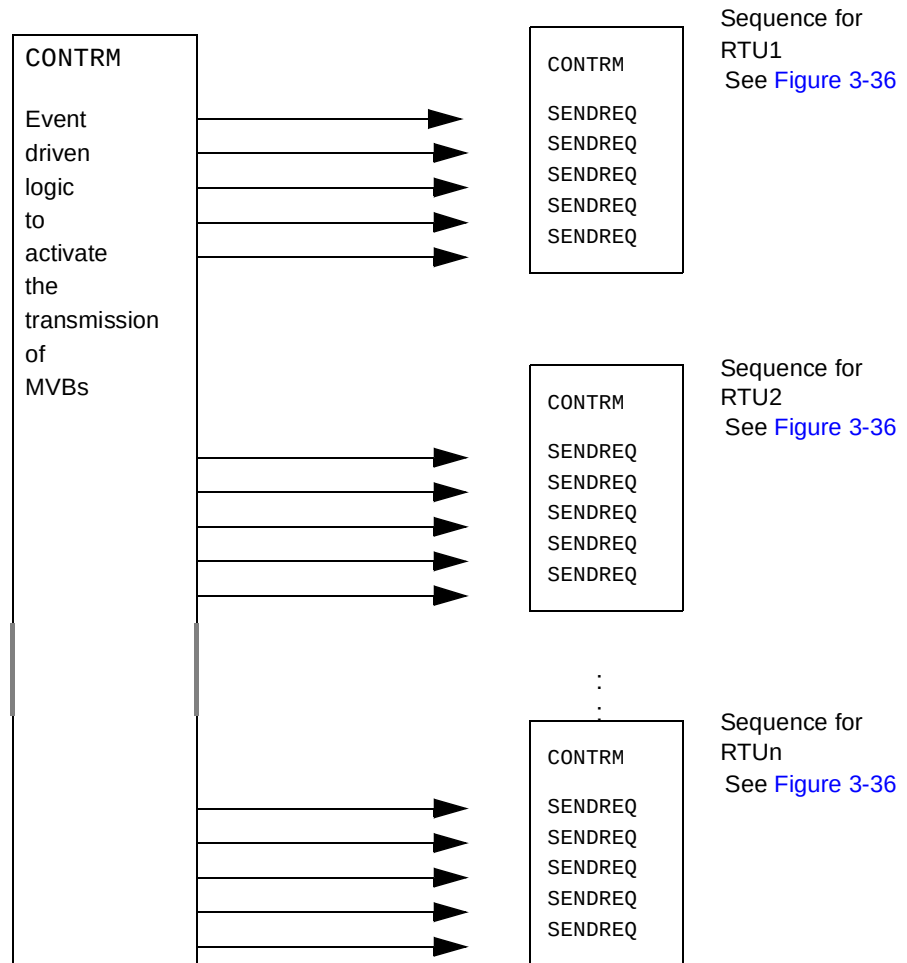


Figure 3-35. Overall PC Program Layout for MVI - Allen-Bradley

3.6.5.1 Type Circuits for MVI - Allen-Bradley Data Flow Control

[Figure 3-36](#) shows a PC program type circuit which is used for data flow control on a MVI - Allen-Bradley asynchronous link. By linking several SENDREQ PC elements to each other with NXTBLK and PRVBLK, the order in which the MVB data base elements are activated can be controlled. By using Link Status and Ready for Message status bits from the MVINODE data base element to control the BLOCK terminal on the SENDREQ element, it can be assured that the CI534V04 submodule does not receive more messages than it can handle.

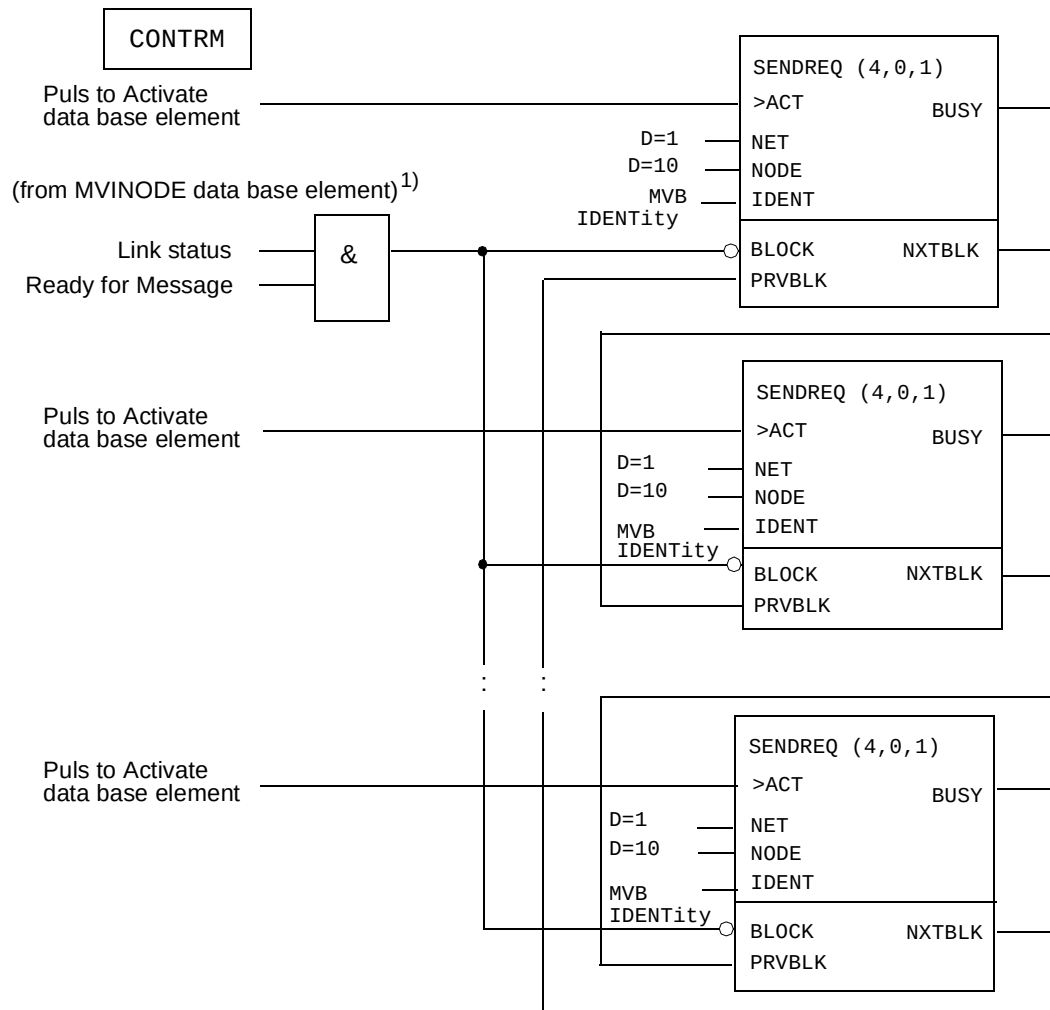
When ACT in the SENDREQ element goes from 0 to 1, the MVB data base element with the identity given by NET, NODE and IDENT is activated once.

NXTBLK is true when sending of an MVB is in progress. When sending is completed, it is set to false. When no sending is in progress, NXTBLK follows the value of PRVBLK.

PRVBLK is used together with NXTBLK to control the activation of the MVB data base elements. No sending begins when PRVBLK is true. If sending orders are given at the ACT terminal during blocking by PRVBLK, the MVB will be activated when PRVBLK is set to false.

No sending takes place when BLOCK is true. If sending orders are given at the ACT terminal during blocking by BLOCK, they are ignored.

Flow control of activation of MVB data base elements is achieved by connecting the NXTBLK output of the first SENDREQ element to the PRVBLK input of next SENDREQ element. The NXTBLK output of this element is then connected to the PRVBLK input of the third SENDREQ element and so on. The NXTBLK output of the last SENDREQ element is connected to the PRVBLK input of the first SENDREQ element. Thus, the SENDREQ elements are connected in a chain, see [Figure 3-36](#). With this PC program sequence, each SENDREQ element will activate its MVB data base element, one for each execution cycle, in the order they are linked together.



- ¹⁾ Status is fetched from the MVINODE data base element for the RTU (in this example node=10), see [Section 3.6.1.2, MVINODE Data Base Element](#)
Link Status = MVN1:VALUE
Ready for Message = MVN1:VALUE6

Figure 3-36. PC Program for flow Control of MVBs

Chapter 4 Runtime Operation

4.1 Operating Overview

Advant Controller 400 must be in operation mode (mode P1, indicated on the front of the main processor module) to communicate on the MVI - Allen-Bradley link. With Advant Controller 400 in configuration mode (mode P2, indicated on the front of the main processor module), the communication is stopped.

After start-up, and with Advant Controller 400 in operation mode, you can perform the following operations:

- From the PC program for activation of commands and flow control
 - Activate/Stop sending of MVB data base element (Read, Write and Status Request command).
 - Re-initiate a channel on the CI534V04 submodule by sending a restart handler command.
 - Restart the CI534V04 submodule by setting/re-setting the terminal SERVICE on the MVIMOD data base element.
- The status information for a node on the MVI - Allen-Bradley link in corresponding MVINODE data base element can be displayed.

4.2 Runtime Tutorial

A Runtime Tutorial is not included in this manual. The reader must be familiar with application commands in Advant Controller 400.

4.3 Operating Instructions

For a description of commands for control of the PC program and data base, please refer to *AMPL Configuration Advant Controller 400 Series Reference Manual*.

Chapter 5 Maintenance

5.1 Hardware Indicators

The CI534V04 submodule has two LED indicators on the front:

- The green LED is lit when the data base element MVIMOD for the CI534V04 submodule is correctly filled in, and the CI534V04 submodule has received the Configuration data base element for one port, see [Section 2.2, Installation Procedures](#) (the terminal IMPL and SERVICE must be set to 1 on the MVIMOD element).
- The red LED is lit when a fatal error is detected on the CI534V04 submodule. The LED is also turned on and off at a reset of the submodule.

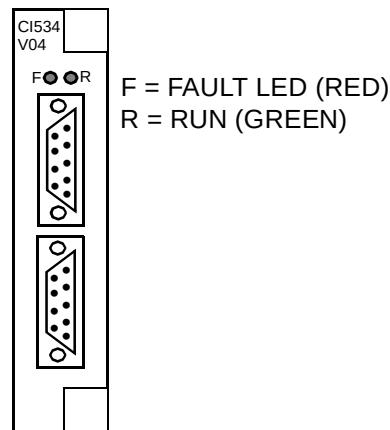


Figure 5-1. LED Indicators on CI534V04 Submodule

5.2 Error Messages

This part of the document lists all system messages that might be generated from the CI534V04 submodule. System messages from the Advant Controller 400 system software are not included. The MVI data set task CXAX000, CXAX0111, . . . , CXAX0151 in the Advant Controller 400, can report a number of errors related to the MVI - Allen-Bradley communication, for example, MVB not found, destination unreachable and so on.

For translation of system messages from the Advant Controller 400, please refer to the *Advant Controller 410 User's Guide* or *Advant Controller 450 User's Guide*.

The error codes indicated on the data base element MVIMOD is translated in the figure below.

Table 5-1. Error Codes from the Data Base Element MVIMOD

Error Code	Interpretation
21	Duplicate node number on the network
22	More than one node number in the station
23	Station connected to more than one Control Network
25	Network number already used in the Advant Controller
31	Module not found or internal bus error
32	Not correct hardware identity on module
33	Start up of module failed
34	Suspected hardware error
35	Not correct software identity on module
36	Not correct module interface identity
50	Illegal submodule number
51	Illegal module position
52	Module position number already used in the Advant Controller
53	Two modules has the same submodule number

Table 5-2. Error Codes from the Data Base Element MVICHAN

Error Code	Interpretation
39	Missing wathdog signal for CI534V04
55	Configuration not sent to the CI534V04

System message printouts on the engineering station have the following appearance:

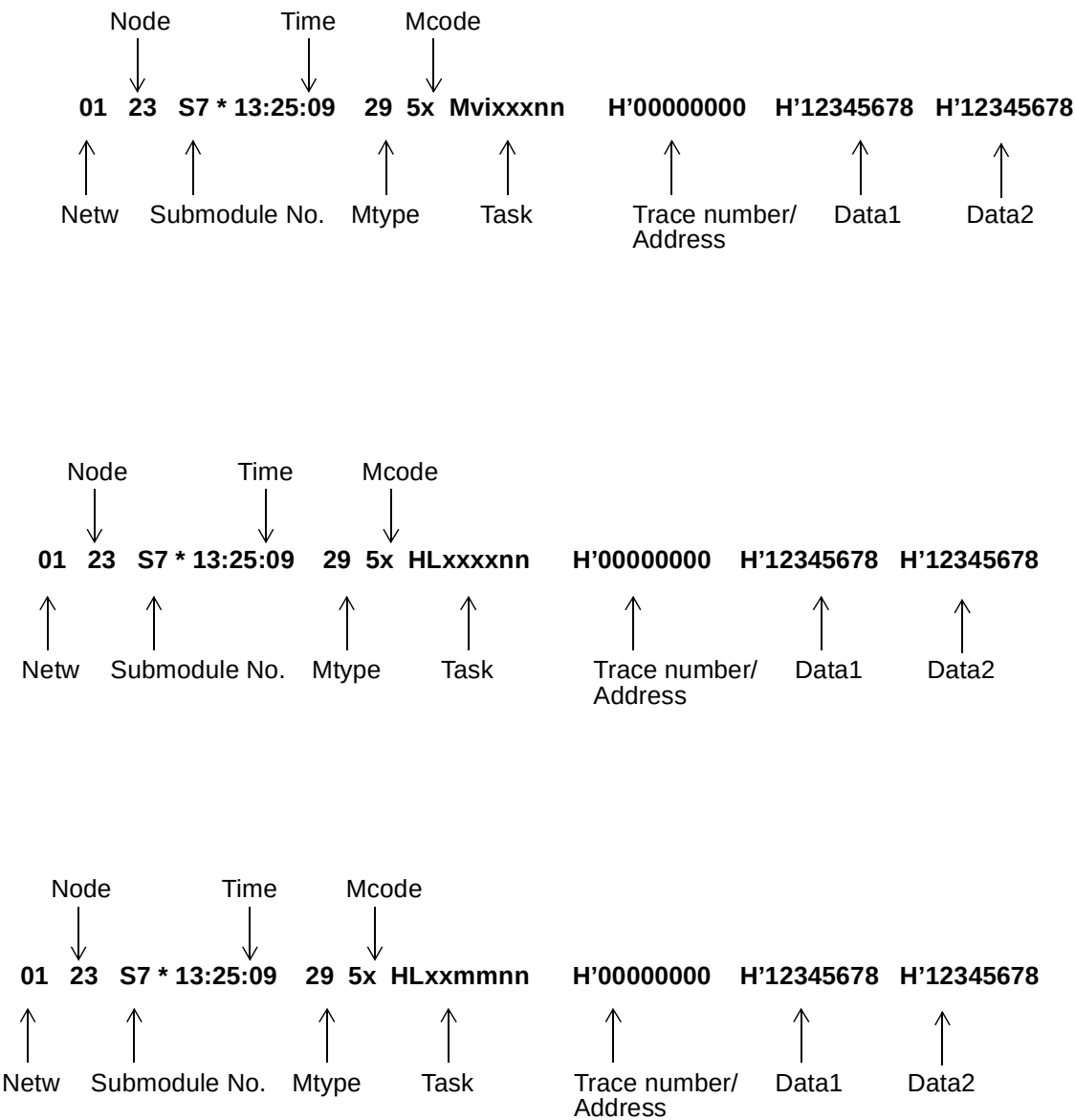


Figure 5-2. System Message Layout

All system messages have:

- Mtype = 29
- Task name = Mvixxxnn
 - xxx = Hdl if the MVI Protocol Handler Network Layer reports the error
 - xxx = DLL if the MVI Protocol Handler Data Link Layer reports the error
 - nn = 01 for port one
 - nn = 02 for port two.
- Task name = HLxxxxnn
 - xxxx = Setu if the MVI Setup task reports the error
 - xxxx = Wdog if the MVI Watchdog task reports the error
 - xxxx = Stat if the MVI Status task reports the error
 - xxxx = LCmd if the MVI Local command task reports the error
 - xxxx = LRsp if the MVI Local response task reports the error
 - xxxx = UCmd if the MVI Up stream command task reports the error
 - xxxx = DRsp if the MVI Down stream response task reports the error
 - nn = 01 for port one
 - nn = 02 for port two.
- Task name = HLxxmmnn
 - xx = DC if the MVI Down stream command task reports the error
 - xx = UR if the MVI Up stream response task reports the error
 - mm = node number, a decimal value.
 - nn = 01 for port one
 - nn = 02 for port two.

Table 5-3. Messages with Mcode = 54 and Task Name = MviHdlmn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00040005	1: File descriptor 2: -	Read from FIFO failed. Reset the MVI module, if the problem persists, please contact ABB.
00040006	1: File descriptor 2: -	Write to FIFO failed. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-4. Messages with Mcode = 55 and Task Name = MviHdlnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00010002	1: - 2: -	Failed to create UART device. Reset the MVI module, if the problem persists, please contact ABB.
00010003	1: File descriptor 2: -	Initiate UART failed. Reset the MVI module, if the problem persists, please contact ABB.
00010004	1: - 2: -	Failed to open UART device. Reset the MVI module, if the problem persists, please contact ABB.
00010009	1: File descriptor 2: -	Parameterize UART failed. Reset the MVI module, if the problem persists, please contact ABB.
0001000b	1: File descriptor 2: -	Failed to fetch event status from UART. Reset the MVI module, if the problem persists, please contact ABB.
0001000d	1: File descriptor 2: -	Failed to fetch modem status from UART. Reset the MVI module, if the problem persists, please contact ABB.
00020002	1: - 2: -	Failed to create watchdog timer device. Reset the MVI module, if the problem persists, please contact ABB.
00020004	1: - 2: -	Failed to open watchdog timer device. Reset the MVI module, if the problem persists, please contact ABB.
00020010	1: File descriptor 2: -	Failed to start watchdog timer. Reset the MVI module, if the problem persists, please contact ABB.
00040002	1: - 2: -	Failed to create FIFO device. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO device. Reset the MVI module, if the problem persists, please contact ABB.
00040005	1: File descriptor 2: -	Read from FIFO failed. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-4. Messages with Mcode = 55 and Task Name = MviHdlnn from CI534V04 (Continued)

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00040006	1: File descriptor 2: -	Write to FIFO failed. Reset the MVI module, if the problem persists, please contact ABB.
0005000f	1: Requested block size 2: -	Failed to allocate memory. Reset the MVI module, if the problem persists, please contact ABB.
00050012	1: - 2: -	Select failed. Reset the MVI module, if the problem persists, please contact ABB.
00060013	1: Node number 2: -	Illegal node number. The node number requested was not configured. Check the configuration and command data base elements.

Table 5-5. Messages with Mcode = 56 and Task Name = HLSetunn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00020002	1: - 2: -	Failed to create a watchdog timer. Reset the MVI module, if the problem persists, please contact ABB.
00030002	1: - 2: -	Failed to create a transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030004	1: - 2: -	Failed to open transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030005	1: File Descriptor 2: -	Failed to read from the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030006	1: File Descriptor 2: -	Failed to write to the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030007	1: File Descriptor 2: -	Failed to close a transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer Reset the MVI module, if the problem persists, please contact ABB.

Table 5-5. Messages with Mcode = 56 and Task Name = HLSetunn from CI534V04 (Continued)

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030016	1: - 2: -	Failed to get host information. Reset the MVI module, if the problem persists, please contact ABB.
00030023	1: Buffer pointer 2: -	Received illegal pointer from the Transceiver Interface. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO pipe device to the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.
00040024	1: File Descriptor 2: -	ioctl on the FIFO pipe failed. Reset the MVI module, if the problem persists, please contact ABB.
0005000f	1: Requested block size 2: -	Failed to allocate memory. Reset the MVI module, if the problem persists, please contact ABB.
0005001f	1: - 2: -	Failed to spawn a task. Reset the MVI module, if the problem persists, please contact ABB.
00050025	1: Task Id 2: -	Failed to delete a task. Reset the MVI module, if the problem persists, please contact ABB.
00050026	1: - 2: -	Failed to create a semaphore. Reset the MVI module, if the problem persists, please contact ABB.
00050027	1: Semaphore Id 2: -	Failed to delete a semaphore. Reset the MVI module, if the problem persists, please contact ABB.
00050028	1: Semaphore Id 2: -	Failed to take a semaphore. Reset the MVI module, if the problem persists, please contact ABB.
00070015	1: DSX mcode number 2: -	Received illegal DSX signal from the Host. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-6. Messages with Mcode = 56 and Task Name = HLStatnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030006	1: File descriptor 2: -	Failed to write to the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO pipe device to protocol handler. Reset the MVI module, if the problem persists, please contact ABB.
00050028	1: Semaphore Id 2: Node number	Failed to take semaphore. If this is reported during restarts of the protocol handler, ignore it, else contact ABB.
00080013	1: Node number 2: -	The node number in the status information received from protocol handler is not valid. Reset the MVI module, if the problem persists, please contact ABB.
00080023	1: Status Info pointer 2: -	Received illegal pointer from the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-7. Messages with Mcode = 56 and Task Name = HLWdognn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030004	1: - 2: -	Failed to open transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030006	1: File descriptor 2: -	Failed to write to the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-7. Messages with Mcode = 56 and Task Name = HLWdognn from CI534V04 (Continued)

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO device Reset the MVI module, if the problem persists, please contact ABB.
00080023	1: Watchdog Info pointer 2: -	Received illegal pointer from the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-8. Messages with Mcode = 56 and Task Name = HLLCmdnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030004	1: - 2: -	Failed to open transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030005	1: File Descriptor 2: -	Failed to read from the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030006	1: File Descriptor 2: -	Failed to write to the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Reset the MVI module, if the problem persists, please contact ABB.
00030023	1: Buffer pointer 2: -	Received illegal pointer from the Transceiver Interface Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO device Reset the MVI module, if the problem persists, please contact ABB.

Table 5-9. Messages with Mcode = 56 and Task Name = HLLRspnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030006	1: File Descriptor 2: -	Failed to write to the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO device Reset the MVI module, if the problem persists, please contact ABB.
00080023	1: Response pointer 2: -	Received illegal pointer from the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-10. Messages with Mcode = 56 and Task Name = HLDCmmnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030005	1: File Descriptor 2: Node number	Failed to read from the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030006	1: File Descriptor 2: Node number	Failed to write to transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: Node number	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Check the configuration and command data base elements.
00030023	1: Buffer pointer 2: Node number	Received illegal pointer from Transceiver interface. Reset the MVI module, if the problem persists, please contact ABB.
0005000f	1: Requested block size 2: -	Failed to allocate memory. Reset the MVI module, if the problem persists, please contact ABB.
00050028	1: Semaphore Id 2: -	Failed to take semaphore. If it appears during protocol handler restart ignore it, else please contact ABB.
0006002b	1: Error number 2: Node number	Unexpected exception encountered. Reset the MVI module, if the problem persists, please contact ABB.
0007002a	1: Node number 2: -	Received more than allowed number of commands from the Host. Reset the MVI module, if the problem persists, please contact ABB.
00090013	1: Node number 2: -	Illegal node number. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-11. Messages with Mcode = 56 and Task Name = HLDRspnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030006	1: File Descriptor 2: -	Failed to write to transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO pipe to the Protocol Handler. Reset the MVI module, if the problem persists, please contact ABB.
00050028	1: Semaphore Id 2: Node number	Failed to take node mutex semaphore. If it appears during protocol handler restart ignore it, else please contact ABB.
00080013	1: Node number 2: -	Illegal node number in the down stream response from the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.
00080023	1: Response pointer 2: -	Received illegal pointer from the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.
0008002c	1: Node number 2: -	Unknown response from the protocol handler. If it occurs immediately after node disconnect of the particular node ignore it, else contact ABB.

Table 5-12. Messages with Mcode = 56 and Task Name = HLUCmdnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030004	1: - 2: -	Failed to open transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030006	1: File Descriptor 2: -	Failed to write to transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030016	1: - 2: -	Failed to get Host information. Reset the MVI module, if the problem persists, please contact ABB.
00040004	1: - 2: -	Failed to open FIFO pipe to the Protocol Handler. Reset the MVI module, if the problem persists, please contact ABB.
00050028	1: Semaphore Id 2: -	Failed to take semaphore. If it appears during protocol handler restart ignore it, else please contact ABB.
00080017	1: - 2: -	Protocol handler illegally sent an upstream command, when one upstream command is already pending. Reset the MVI module, if the problem persists, please contact ABB.
00080023	1: Command Info. pointer 2: -	Received illegal pointer from the protocol handler. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-13. Messages with Mcode = 56 and Task Name = HLURmmnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00030005	1: File Descriptor 2: Node number	Failed to read from the transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
00030006	1: File Descriptor 2: -	Failed to write to transceiver channel. Reset the MVI module, if the problem persists, please contact ABB.
0003000f	1: Block Size 2: -	Failed to allocate transceiver buffer. Reset the MVI module, if the problem persists, please contact ABB.
00030023	1: Buffer pointer 2: -	Received illegal pointer from transceiver interface. Reset the MVI module, if the problem persists, please contact ABB.
00030024	1: Transceiver Channel File Descriptor 2: Node number	ioctl operation on the high priority transceiver channel of the remote node failed. Reset the MVI module, if the problem persists, please contact ABB.
00050028	1: Semaphore Id 2: Node number	Failed to take semaphore. Reset the MVI module, if the problem persists, please contact ABB.
0005002d	1: Receiving Task Id 2: Signal number	Failed to send signal to the task Reset the MVI module, if the problem persists, please contact ABB.
0006002b	1: Error number 2: Node number	Unexpected exception encountered. Reset the MVI module, if the problem persists, please contact ABB.
0007002c	1: Node number 2: -	Illegal up stream response from Host. Reset the MVI module, if the problem persists, please contact ABB.
00090013	1: Node number 2: -	Illegal node number. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-14. Messages with Mcode = 58 and Task Name = MviHdlnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
0005001F	1: Task instance 2: -	Fail to start the Protocol Handler for the Data Link Layer. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-15. Messages with Mcode = 59 and Task Name = MviDLLnn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00010005	1: File Descriptor 2: -	Read from UART failed. Reset the MVI module, if the problem persists, please contact ABB.
00010006	1: File Descriptor 2: -	Write to UART failed. Reset the MVI module, if the problem persists, please contact ABB.
0001000b	1: File Descriptor 2: -	Failed to fetch event status from UART. Reset the MVI module, if the problem persists, please contact ABB.
0001000e	1: File Descriptor 2: -	Failed to cancel read descriptor. Reset the MVI module, if the problem persists, please contact ABB.
00020010	1: File Descriptor 2: -	Failed to start watchdog timer. Reset the MVI module, if the problem persists, please contact ABB.
00020011	1: File Descriptor 2: -	Failed to cancel watchdog timer. Reset the MVI module, if the problem persists, please contact ABB.
00050012	1: - 2: -	Select failed. Reset the MVI module, if the problem persists, please contact ABB.

Table 5-16. Messages with Mcode = 60 and Task Name = MviHdlmn from CI534V04

Trace Number (Hexadecimal)	Parameter Description 1 = data1 2 = data2	Comments and Suggested Actions
00020010	1: File Descriptor 2: -	Failed to start watchdog timer. Reset the MVI module, if the problem persists, please contact ABB.
00020011	1: File Descriptor 2: -	Failed to cancel watchdog timer. Reset the MVI module, if the problem persists, please contact ABB.
00070014	1: PLC Type 2: -	Illegal PLC Type. Enter correct PLC Type in the MVB.
0007001b	1: Command Code 2: -	Illegal command code. Enter correct command code in the MVB terminal AUXINFO1.

5.3 Fault Finding and User Repair

If you follow the instructions in [Chapter 2, Installation](#) and in [Section 3.6, Configuration of MVI - Allen-Bradley Application Data Base and PC Program](#) and still do not have a correctly working communication link, please check the following:

1. Are Modems and Cables correctly Set-up?

The CI534V04 must receive the correct modem signals. In half duplex mode the DSR must be set and DCD and CTS toggle between 0 and 1.

Current DSR, DCD and CTS values are available in the data base element MVICHAN.

NOTE

Displayed values from the MVICHAN element on the engineering station are not always synchronized to the actual value change of the modem signals; short pulses may not be displayed.

The modem signals are set up by the modem or, in full duplex mode, you can wire them in the 9-position connector on cable TK577, or in the 9-position connector on the MVI side on cable TK595 (see [Figure 2-7](#)).

2. Is the MVIMOD Data Base Element correctly Filled in?

You must define the same node number for all the communication boards in an Advant Controller 400 node. All network numbers in the Advant Controller 400 node must be unique (for CI534V04 1-9).

POSITION and SUBPOS must match the actual position of the submodule CI534V04. IMPLEMENTED and SERVICE must be set to one. CHANNEL1 and/or CHANNEL2 must refer to the correct MVICHAN element.

If the network number or node number for any of the communication modules in the Advant Controller 400 is changed after the start-up of the node, the Advant Controller 400 must be COLD STARTED. Connect an engineering station to the Advant Controller 400 and make a DUAP, press ENTER on the main CPU with start-up switch in "CLEAR" position and make a LOAP.

3. Check the Data Base and PC Program Application.

- a. The Configuration data base elements (MVICHAN and MVINODE data base elements) must be built. The station number entered in the MVICHAN should correspond to the actual number of the Network Interface. The green LED on the CI534V04 submodule is lit when the configuration is successfully transferred to the module.
- b. MVB data base elements must be built and the PC program with SENDREQ-elements for the flow control must be built and started.

4. Are there any System Messages reported in Advant Controller 400?

Check system messages by connecting an engineering station to the Advant Controller 400. Also check the system messages when you restart the CI534V04.

To restart the module, set the terminal SERVICE to 0 and back to 1 in the MVIMOD element. All configuration errors are reported at start-up. Error messages with Mtype 29 are translated in [Section 5.2, Error Messages](#).

NOTE

Some errors are only reported once.

5. Which Status Bits are set in the MVINODE Data Base Elements, Section STATUS1?

VALUE (bit0) is set when the Advant Controller 400's connection to the RTU is established, see [Table 3-7](#).

If you know the answers to the following questions, further analysis will be easier:

- a. Are modems and cables installed as described in the *Advant OCS Installation Rules* manual? Pay particular attention to the power supply and connection to signal ground.
- b. How is your control system configured? A block diagram with all node and network numbers is useful. Note also the type of RTU, the nodes on the asynchronous link and the type of modem you are using.
- c. Have you made any significant changes in your configuration (for example, new communication board (s) added, new modems)?
- d. Is it possible to repeat your problem?
- e. Have you found any way to circumvent the problem?
- f. Have you made any other observations related to the problem?

A test tool for monitoring the status of the V.24 leads is also useful for further analysis. The test tool shows the status, with LED indicators, of the modem signals, data transmission (TD) and reception (RD). When an analysis of the data flow on the MVI - Allen-Bradley asynchronous link is necessary, you need a Serial Line Analyzer that monitors and stores the messages sent on the link.

Appendix A Hardware Module

A.1 CI534V04 - Allen-Bradley Communication Interface

CI534V04 - Allen-Bradley Communications Interface has:

- Two RS-232-C communication interfaces
- Modem support

Description

CI534V04 - Allen-Bradley MultiVendor Interface is a submodule destined to the submodule carrier SC510 and SC520 in Advant Controller 450 and Processor Module PM150 in Advant Controller 410.

The two RS-232-C communication interfaces are used for communication with the Allen-Bradley protocol. The communication channels support communication speed up to 19.2 kbit/s which is the limit set by the system software. Both channels can run at this speed simultaneously.

The maximum communication distance without modems is 15 m.

The modem signals which are supported can be found in [Table A-1](#) below.

Communication PINs are short circuit proof.

Technical Data

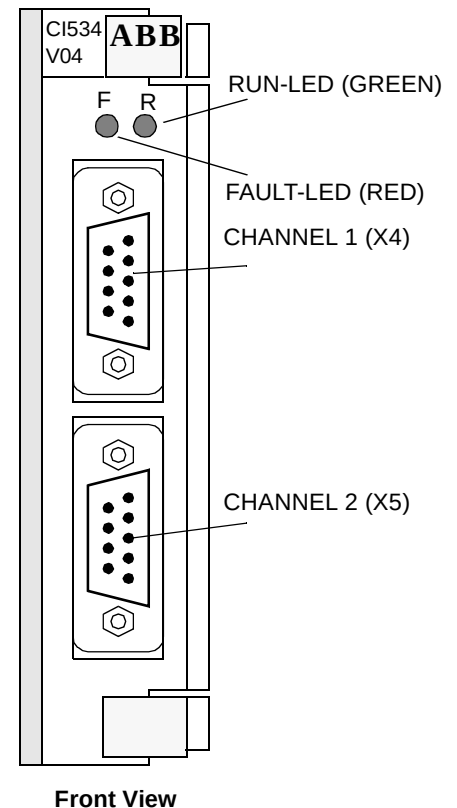
Indicators

LED R, Run (green) on module front. Indicating module running normally.

LED F, Fault (red) on module front. Indicating a fatal error detected on the CI534V02 module. The LED is also turned on and off at reset of the module.

Jumpers

The board contains one jumper for special purposes. In normal operation always keep the S1 in position 3 - 4 ("parking place"). The component and position indications are found on the printed circuit board.



Connectors

Serial channels 1 and 2 connectors (X4 and X5):

- Connector type 9-pole male DSUB (DE9P)
- Placement On module front
- Pin designation See [Table A-1](#) below.

Table A-1. Pin Designation for Channel 1 and 2, Connector X4 and X5

Pin	Short	Description
1	DCD	Data Carrier Detect
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

Power Supply

5 V	typical	400 mA
	max.	670 mA
24 V	max.	40 mA
Power loss (heat)	typical	3 W

Mechanical Data

Module size: The module occupies one submodule slot (H = 95 mm, L = 140 mm connectors not included).

Weight: 0.13 kg

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